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**Home Health Care Product Design and Research
For The Younger Elderly in Urban China
Based on Simplified Kansei Engineering**

by

Ruiling Song

A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Master of Design

Department of Art and Design

**Ruiling Song
Spring, 2010
Edmonton, Alberta**

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Abstract


Along with studies on human-centred design, much research related to design is focused on improving the psychological pleasure people get from products. Simplified kansei engineering is an improved method based on the fundamentals of kansei engineering, suitable for use by small businesses¹ as they plan a design survey, identify the design target, and especially as they improve the psycho-pleasure of their products.

A survey and design activity was conducted in order to describe and test this methodology. The survey targeted the *younger elderly*, aged 60–70, from three typical cities in China. It focused on psychological comfort in the home healthcare products market. From the results of the survey, general design features were discovered: natural, simple, friendly, comfortable, and reliable. Utilizing a modified methodology based on the fundamentals of kansei engineering, designs were developed for a medication collector for open-space use and two types of digital healthcare assistants for home use.

Key Words

Younger elderly, kansei engineering (KE), small design business, home healthcare, semantic differentials (SD)

¹Small design business: In this thesis, this term refers to individual designers, small design companies, design students, or any kind of design group with limited resources.



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Acknowledgements

The work in this thesis would not have been possible without the kind assistance and support of a very important group of people. Firstly, I gratefully acknowledged the sustained enthusiastic support of my supervisor Robert Lederer. His encouragement, sound suggestions not only developed this thesis, but also oriented my future research. I thank Cezary Gajewski, Lili Liu, and Bonnie Sadler Takach for thoughtfully questioning my ideas methodology and survey. I am thankful to Cam Firth, Ben King, and Hongjie Zeng for generously sharing their prototyping expertise. Many thanks to Ken Horne and Partrick von Hauff for their effort to improve my writing skills. I would also like to acknowledge the help I received from Jurd Dong, Ethan Chen, Haining Bi, Peter Gao, and Yingxin Zhao. They helped make my survey processed and finished, and I really appreciate.

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Part 1 Introduction and Methodology Development

Chapter 1 Introduction

1.1 Predesign Research

The product design process comprises several activities. Before the direct design steps, such as concept-mapping and sketching, are undertaken, a target for the design must be prepared, that is, it must be decided what kind of design is needed. Previously, human measurement was used to make product design more physically comfortable. This activity was given the term *ergonomics* in Europe and *human-centred* or *human-factors* in North America. “The basic human sciences involved [in ergonomics] are anatomy, physiology, and psychology. The psychology factors can be seen as aiding the cognitive ‘fit’ between people and the things they use” (The Ergonomics Society). The kinds of pleasure that people experience with products has been divided into four types by a Canadian anthropologist Lionel Tiger: physical, social, psychological, and ideological. “*Psycho-pleasure pertains to people’s cognitive and emotional reactions. In the case of products, this might include issues relating to the cognitive demands of using the product and the emotional reactions engendered through experiencing the product.*” (Jordan, 13–14). Predesign research is concerned with designing pleasurable products and aiding the cognitive “fit” needed to improve people’s well-being. Design research related to people’s psycho-pleasure is termed *emotional design* in North America and *kansei engineering* (KE) in Japan. However, the KE philosophy goes much further: It tries to find an efficient, scientific method of understanding the mechanisms related to people’s psychological needs in product design. This thesis develops a methodology to discover people’s psychological needs in order to improve products in terms of their psycho-pleasure. The methodology is based on KE, but is tailored to small design businesses.

1.2 Introduction to Kansei Engineering (KE)

Kansei is a Japanese term that means “*senses, consciousness, and feeling*” in English. Kansei Engineering is defined as “*translating the customer’s kansei into the product design domain*” (qtd. in Nagamachi 289). In other words, “*The aim of Kansei Engineering is to develop a new product by translating a customer’s psychological needs and feelings (Kansei) concerning it into design specifications*” (Nagamachi, Okazaki, and Ishikawa 763). It is an “*ergonomics and consumer-oriented technology for producing a new product. If the consumer’s feeling could be implemented in the new product, he/she would be more satisfied with the product*” (Nagamachi 289).

This method was invented in the 1970s by Mitsuo Nagamachi, Dean of Hiroshima International University. It is intended to “measure” the feelings elicited by a certain product’s properties, with the goal that products be designed to bring forward an intended feeling.

As a methodology, KE focuses a certain design on a consumer’s kansei (feeling/perception), other than focusing on a consumer’s physical comfort. In other words, A standard KE procedure (Nagamachi, Okazaki, and Ishikawa 766) is shown below.

Step 1: Kansei word collection: Kansei words related to the product domain under consideration are chosen from magazines, customer conversations, and salespeople’s terms.

Step 2: Semantic differentials (SD) scale evaluation: The kansei words are evaluated using an SD scale.

Step 3: Kansei SD scale evaluation: The products selected from the same or related design market are evaluated using a kansei SD scale.

Step 4: Multivariate analysis: To reach the final design specifications, the evaluated data are analyzed using multivariate analyses, such as principal component analysis and quantification theory type I (a method used to quantify qualitative data).

As shown above, the primary KE methodology consists of obtaining design specifications through a series of surveys, thereby making the entire design process very logical and scientific. Many corporations and institutes, most of them based in Japan, have employed KE into their product development. KE can be utilized in a wide range of design domains with various method modifications. According to the design procedure, KE can be divided into two main areas:

1. Forward KE: from kansei to design
2. Backward KE: from design to kansei

The examples listed below are implementations of KE that use different kansei collection methods or data analysis methods:

1. Category of classification, as developed by Mazda
2. Multivariate analysis, by Milbon
3. Hybrid kansei engineering (both forward and backward KE), by Nissan
4. The kansei mathematical model, by Sanyo
5. Virtual kansei engineering in the space-design domain, by Matsushita Electric Works and Hiroshima University
6. The collaborative kansei design system for group designing
7. Rough set theory for rough and ambiguous data

KE is a very effective method of making design more consumer oriented and of enhancing a product's psychological comfort. There have been many successful products designed using this methodology, such as the Mazda Miata, Nissan's steering wheel, and Milbon shampoo. All of the examples mentioned above have modified KE—either the kansei word collection or analysis methods—to fit their ongoing design needs. All of them involved either the use of large surveys and analysis work or an intelligent software platform to assess data and design concepts.

In my research, I found very few details about the various data analysis methods in use. In terms of KE related to practical mass production, I assume that the analyses involved are proprietary. The completion of a design based on standard kansei engineering procedures requires the investment of a substantial number of resources. Human resource, for example, are required in order to conduct large surveys, and these surveys need to be done by people specialized in design, statistics, and psychology. The building of a KE database system or intelligent software also requires considerable financing. Therefore, the KE procedure is not feasible for individual designers, small design companies, design students, or any other design group with limited resources.

On the other hand, the scientific characteristics of KE provide a valuable platform for coordinating designers and engineers. In modern industry, designers and engineers usually work together to develop new products. Unfortunately, they often have difficulty communicating with each other. Design involves creative work, and it delivers ambiguous information to engineers. In contrast, engineering is a very precise field; any ambiguity is unwelcome. KE makes the designers' concepts clearer and helps them to communicate more accurately. It is reasonable to assume, therefore, that KE would be very meaningful if it could be used widely by small design businesses.

1.3 The Semantic Differential (SD) Scale

The Semantic Differential (SD) is a term from psychology and linguistics. In this paper, SD means the different perceptions or understandings of a word, usually an adjective, by different people. And the SD method used in KE is a scaling procedure. The scales used are several pairs of antonyms. There are several criteria for selecting the proper scale for the SD analysis (Osgood, Suci, and Tannenbaum, P78-8).

The first criteria for selecting scales is their factorial composition. Every scale selected must present a different factor or quality maximally, which consequently will also be minimally represented by other scales.

Another criteria in scale selection is relevance to the concepts being judged. In KE, the concepts being judged are the kansei words, which are words describing the customers' feelings toward a product. Furthermore, as this is a method used in the professional design field, several scales related to aesthetics should also be included, such as *beautiful–ugly*, *bright–dark*, and so forth. Aesthetics in this context is related to a user's kansei feeling as concerns design, so some psychologically related adjectives were used in this study, such as *brave*, *cowardly*, *meaningful*, and *meaningless*.

The third criteria governing the selection of scales is that the semantic should be stable for the concepts and subjects in a particular study, and the scales should be linear between polar opposites and pass through the origin. For example, the word *sweet* doesn't have a stable meaning: it can mean *cute*, *warmhearted*, *lovely*, and so on. However, *sweet* will refer particularly to taste when *bitter* is at the other end of the scale, and the scale is linear between *sweet* and *bitter*.

Chapter 2 Simplified Kansei Engineering

2.1 Simplified KE Model

As seen in the statement and examples listed in section 1.2, the KE methodology is complex and largely inaccessible to small design businesses. Therefore, it is necessary to modify it to easy-operate and accessible.

Through work done with standard KE procedures and modified procedures developed by certain corporations and institutes, it is known that kansei words are a very basic element in KE. When it comes to small design businesses, they might collect kansei words through more accessible methods, such as interviews, questionnaires, and media resources. Their collection may not be very intensive, but a group of 20–30 words is easily achieved. Those kansei words are called the *original kansei words*.

Following standard KE, all of the original kansei words need to be evaluated using SD scales. This involves repetitive work and a lot of time and labour, but these SD scale evaluations are very necessary in learning to understand customers' feelings. I suggest integrating all of the kansei words into several *final kansei words* (FKW). Kansei word integration will then cut down the SD scale evaluation work. More specifically, all of the 20–30 kansei words collected will be integrated into approximately 4–7 final kansei words, although the number of final kansei words can be adjusted based on the demands of the design—it is not necessary that it be exactly 4–7 words.

Next, the FKW are evaluated by customers using selected SD scales. An example SD scale is suggested in section 2.2. At the same time, a group of existing products are evaluated using the FKW and a regular marking method, in order to discover the optimum design features. In summary, the simplified procedure is:

Step 1: Kansei word collection. Implemented through practical methods such as paper or online questionnaires, target group conversations, and related article research.

Step 2: Kansei word integration. The kansei words are integrated into approximately 4–7 final kansei words by the designer. Those final kansei words embody the feature of the product under consideration. This step is a subjective step, but the integration process will be affected by the design brief.

Step 3: SD scale evaluation. The final kansei words are placed on a SD scale of 5–7 points in it. The purpose of this step is to test whether the customers have common notions about the words. The words with the most common notions are considered primary design features; the others are considered secondary design features. Meanwhile, the designers can obtain some design clues from the SD scale, such as customers' perceptions of the final kansei words in the design-related scales.

Step 4: Existing product evaluation. A group of related products are evaluated using the 5–7 kansei words. Products with more extreme scores and lower standard deviation become the primary design reference; the other products become secondary design references. In addition, the design features provided by the primary design reference have priority when the secondary design references have opposing design features. Standard deviation is recommended as the primary analysis method, as opposed to the multivariate analysis methods, because standard deviation is easier to understand and master.

Through the four steps above, ambiguous or uncertain solutions or design features can be identified. This simplified procedure, which is based on standard KE, is named *simplified KE*. This simplified KE model is very open; any small design business could modify it to make the methodology suit their design tasks.

2.2 Example SD scale for Simplified KE

The building of the 7-point SD scale is based on the three criteria above, in section 1.3. It includes sweet–bitter, fair–unfair, warm–cold, beautiful–ugly, meaningful–meaningless, brave–cowardly, and bright–dark. These 7 scales are quite commonly used for semantic differential testing. Every scale presents a different factor from the others. Based on my research, the beautiful–ugly scale represents general aesthetic composition. Warm–cold and bright–dark refer to the colour and material. Fair–unfair, meaningful–meaningless, and brave–cowardly are three basic orientations of human psychology. Sweet–bitter is a test of smell or gestation, if those aspects are required in the design task.

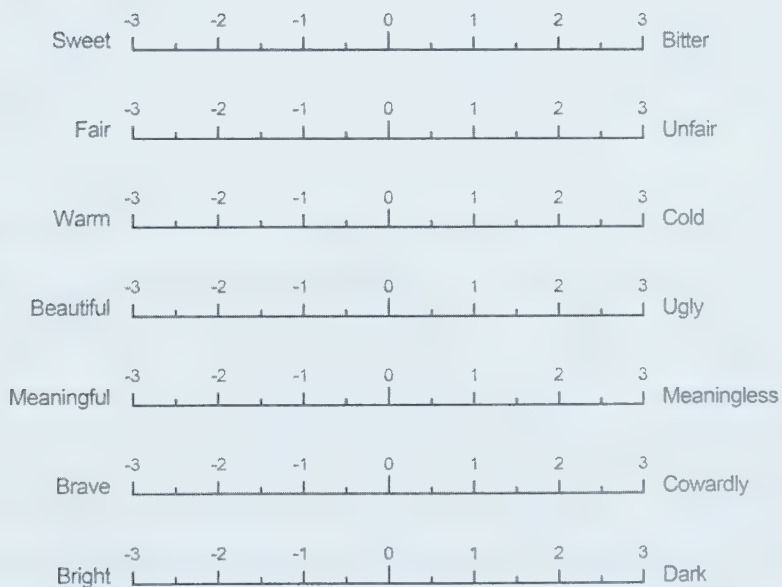


Figure 2-1 Example SD scales

Part 2 Design Practice

Chapter 3 Background Investigation, Survey, and Data Analyses

3.1 Background Investigation for the Design Practice

The procedures listed in section 2.1 are very abstract. Therefore, I conducted a design practice, to test whether simplified KE works effectively and efficiently. Due to my research and design interests, I decide to design health products for the aging Chinese population.

There has been a boom in the Chinese home healthcare market resulting from the demands of China's senior population. Therefore, I decided to examine home healthcare product design using a survey focused on younger seniors, ages 60–70, living in urban China. All of the survey and evaluation methods used were based on simplified kansei engineering.

Younger seniors, or the *younger elderly*, in urban China are an identifiable group of persons facing a great change in their lives. Firstly, “sensory and perceptual abilities declined by aging, such as vision problems, hearing loss and tactile sensitivity. All these change will be very evident after the age of 60 years, and influence their everyday life” (Li and Lederer 106–113). In addition, a majority of these people suffer from medical problems, and there is a change in their social roles at this age, which often leads to a decline in their psychological health too. In China, the retirement age ranges from 55–65 by law, according to the level of employment, and retirement is enforced. Most people leaving their employment feel lost, and they find it hard to get used to retirement. Additionally, retirement comes with the social label of *old*. There are enormous numbers of younger seniors still on the job, and some of them are playing a key role in their companies or institutes. Sometimes it is uncomfortable for them to hear words like

retirement, disease, and old.

3.1.1 *Population Aging and Living Status of the Aged in Urban China*

It is known that the aging population is a very critical problem in a number of countries, and it has also become much more serious in China. “China has an enormous population and ‘one-child’ Policy, and an accelerated model of mortality and fertility decline” (Chen and Liu 157–159). The dependency ratio¹ of China in 2007 was 1.51, which is higher than Canada at 1.29. The world average is 0.82 (World Bank). In China this high dependency ratio results from the increasing aged population. The change in the population aging structure shows that 50% of the population of China was middle aged by 2000, but seniors will constitute almost a quarter of the population by 2025 (Figure 3-1).

“China’s economy has been rapidly growing, and the society has been dramatically changing since early 1980s, when economic reform and the open-door policy were launched. Accompanying those changes, the Chinese family household size has been decreasing, and the proportion of the elders, who do not live with their children, has increased dramatically” (Yi and Wang 96, 98–105). The generation born in the 1970s and 1980s in urban China has expanded their opportunities by moving out of their parental homes to enrol in college or start careers. It is common for these children to partially or completely support their parents financially. This can be understood as an act of filial piety (see section 3.1.4), which is “an integral part of the Chinese value system, cultivated by Confucianism, [that] means that children must be deferential and completely obedient to their parents during their lifetime[s]” (Chen and Liu 161). Today, however, their parents do not need the support. As such, the children live apart from their parents due to the modern changes; therefore, the parents have to take care of themselves

¹ The dependency ratio is the ratio of dependents—people younger than 15 and older than 64—to the working-age population, between ages 15–64.

in everyday life.

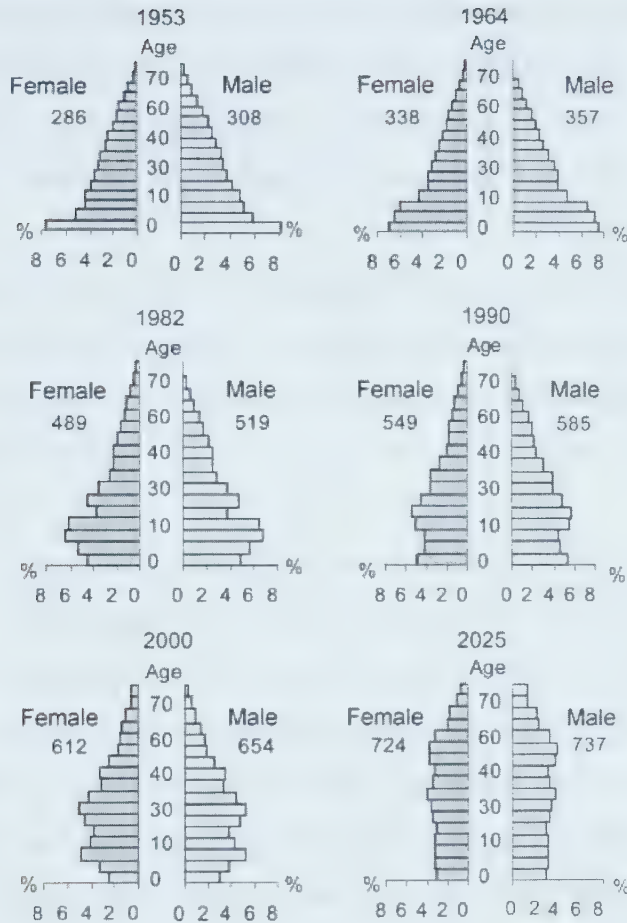


Figure 3-1 population by Age
(women and men in China Facts and Figures 2004, 12)

3.1.2 Healthcare and the Health Insurance System in Urban China

Unlike Canada, the health insurance system in China is undeveloped, and the availability of health resources is limited and unbalanced. The best healthcare resources, including human resources and financial support, are found in large-sized public hospitals in urban areas. Additionally, there is no such thing as a family doctor. The one and only way to receive reliable treatment is to go to a large hospital, but access to healthcare has become widely unequal. Consequently, enormous numbers of patients from all over the country

tend to pursue better medical treatment in large hospitals. This creates a system of crowding in hospitals in large urban cities. The healthcare and health insurance system reform of the 1980s allowed the government to offload responsibility for most healthcare costs. Therefore, people were forced to seek resources from private health facilities and practices. As would be expected, medical costs increased due to this reform.

The network of the system is poor. Normally, neither the hospital nor the physician is responsible to tracking the patients' medical records. Everyone has to keep their own medical records, which are usually in brochure form, mostly handwritten, and can differ from hospital to hospital.

3.1.3 *The Market and Research Related to Products for the Elderly in China*

Physicians will recommend that patients purchase health monitoring products as necessary, to help patients track their health conditions. However, physicians are not allowed to recommend a certain brand of products. The patients usually consult with their physicians to obtain the information they need to make a decision on healthcare products, such as how necessary it is to monitor their health conditions, whether the products are reliable or not, and if the monitoring can replace follow-ups or annual check-ups.

There are two group of people who would purchase home healthcare products. One is the aged and their spouses, another is their children. Generally speaking, the aged people interested in purchasing healthcare products are middle- or upper-class urban residents. They have a higher economic standing, more self-cared, and have higher levels of education than the youth, middle-aged, and the aged living in the suburbs.

There are various types of merchandise designed for the elderly. Electronic products are a

good example: A large number of cell phones at present claim to have been designed for the elderly. However, these designs for the elderly are “not pure”,² and almost all of the design is focused on the physical needs of the elderly, such as a large font, large buttons, and brighter displays. These aging-related considerations are add-ons to normal products, as opposed to being specially customized for the elderly.

Due to the serious issue of the increasing proportion of the elderly, as discussed above, a wide range of research has been focused on age-related issues and numerous age-related medical fields. Many home healthcare products have been developed due to this demand. Such products include blood pressure monitors, blood glucose meters, and mini massage devices. As mentioned, physical factors are the main consideration in the design; the psychological factors are largely ignored.

3.1.4 *Filial Piety and the Role of the Median Aged*

Filial piety is a critical element in the Chinese traditional value system, and it implies that children are fully responsible for taking care of their aging parents. Usually, the health of the parents is an important concern for children. It is a very common scenario that aged parents go to the hospital accompanied by one or two of their children. Concerned children want to know about their parents’ health, and to make sure any health condition is well monitored.

Due to changes in Chinese society and its economy, it is often no longer practical for children to take care of their aging parents in the traditional way, because the parents and the children live separately, sometimes quite far away. Children instead keep in touch with their parents using modern technology, such as the internet or mobile phones.

² Said by Peter Gao, see Appendix II iv-2

3.2 Simplified KE Modification and Survey Design

As mentioned in section 2.1, the design task under consideration has been based on the simplified KE model, but some modifications were required for the sake of this design practice. The design is very open and does not have many constraints, such as clients' contract. Due to my research and design interests, I have decided to design some health products for the aging Chinese population. In this case, I did not have a specific product that needed to be designed or improved, and thus I designed a survey with several interviews and a questionnaire, in order to investigate some design breakthrough points.

Given the context discussed in section 3.1, both senior and youth subjects are involved in my survey, and the sample also included professional designers. Both designers and physicians are important resources for the kansei word collection in this case. The latter play a major role in seniors' purchasing decisions. This data can therefore help to analyze the needs of the aged.

Some conversations and interviews were conducted, including a very brief questionnaire with some structured and semi-structured questions. Both of these were designed to detect kansei words. Following the questionnaire, both a FKW evaluation using the SD scale and an evaluation of existing products were undertaken. Both the elderly and youth participants completed these two evaluations. The SD scale (see Figure 3-1) was built according to the criteria of the scale selection, and these scales were also used for SD.

3.3 Ethics Approval

A structured survey process was used to obtain the kansei words, SD scale evaluation, and product evaluation. The survey was conducted in Beijing, Jinan, and Renqiu, China, over a two-month period during December 2008 and January 2009. Ethics approval for the project was obtained from the Faculty of Arts, Science, and Law Research Ethics

Board, University of Alberta (see Appendix 1).

3.4 Target Group

In terms of this Master's thesis, the user is the client. Because of my research interest and the context described in sections 1.1 and 1.2, I have chosen to design home healthcare products for the aged. My target group is *the younger elderly*, aged 60–70, living in urban China, who are well educated, retired from their jobs or about to retire, and are in relatively good health.

Due to the history of modern social structure in China, the current generation of *younger elderly* had a hard time obtaining higher education when they were young. In this context, “well educated” means that they are literate and that they held respectable jobs, such as teacher, engineer, or officer. Furthermore, it means that they have a steady income, a guaranteed pension that is enough for living expenses, and they are covered by the national health insurance system.³ Additionally, the *younger elderly* are supposedly the main consumer group of healthcare products. They are concerned with their health and invest to stay healthy through regularly physical check-ups, organic foods, and home healthcare products.

Their relatively good health means that the *younger elderly* can generally manage their everyday lives without assistance, although they may be suffering from some common chronic conditions such as diabetes, high blood pressure, or heart diseases.

3.5 Data Analysis and Results

Interviews with two physicians and one interview with a professional product designer

³ People aged 60–70 are covered by the old health insurance system and they do not need to pay insurance fees. However, in actuality, less than 10% of residents living in rural areas are covered, whereas urban residents with permanent jobs are.

were completed, and a group conversation with both the elderly and youth groups were conducted. The purpose of this activity was to collect kansei words. The list of words collected is as follows: easy to operate, multifunctional, simple interface, buttons preferred, solid looking, precise, automatic, real-time control, fewer wires, easy-to-read output, soft/natural material, information network, reliable, warm, cool, neat, fashionable, attractive, notable, graceful⁴ I integrated these words into five final kansei words (FKW).

Reliable: representing the meanings of buttons preferred, solid looking, precise, real-time control, and information network.

Comfortable: representing easy to operate, easy to use, multifunctional, fewer wires, easy-to-read output, and graceful.

Simple: representing easy to operate, easy to use, simple interface, automatic, real-time control, fewer wires, and neat.

Friendly: representing easy to operate, easy to use, easy-to-read output, soft/natural material, information network, fashionable, attractive, and notable.

Natural: representing buttons preferred, fewer wires, easy-to-read output, soft/natural material, warm, and cool.

The *younger elderly* and youth were born in completely different times: Chinese society and in particular the economy have improved enormously, accounting for a greater

⁴ . Those words are collected in Chinese as below: 操作简单, 多功能, 简单的界面, 按钮, 实在的, 准确, 全自动, 实时控制, 接线少, 易读, 柔软的材料, 信息网络, 可靠的, 温暖的, 清爽的, 灵巧的, 时尚的, 吸引人的, 鲜艳的, 优雅的

variance in results. Based on the evaluation of the existing products,⁵ it appears that the *younger elderly* are generally experiencing greater living satisfaction than the youth. In contrast, the youth have a higher expectation of the satisfaction that products should deliver than do the elderly. This can be seen in Table 3-1 and Table 3-2. The scores of the youth are lower than those of the elderly. The products with higher scores are completely different for the two groups.

| | Reliable | Comfortable | Simple | friendly | natural |
|------------|----------|-------------|--------|----------|---------|
| Product 1 | 3.4 | 3.3 | 4 | 3.2 | 2.7 |
| Product 2 | 2.3 | 2.2 | 1.9 | 2.3 | 2.6 |
| Product 3 | 3 | 4 | 3.9 | 3.9 | 3.1 |
| Product 4 | 4.7 | 4.2 | 3 | 3.4 | 2.7 |
| Product 5 | 3.3 | 3.7 | 3.7 | 3.6 | 2.9 |
| Product 6 | 3.1 | 3.9 | 3.8 | 3.8 | 3.4 |
| Product 7 | 4 | 3.1 | 4 | 3.2 | 3.1 |
| Product 8 | 3.3 | 3.6 | 3.6 | 3.9 | 3.2 |
| Product 9 | 3.6 | 3.3 | 3.1 | 3.3 | 3.1 |
| Product 10 | 3.4 | 3.4 | 2.9 | 3 | 2.8 |
| Product 11 | 3.2 | 3.5 | 3.4 | 4 | 3 |
| Product 12 | 3.8 | 2.9 | 2.6 | 3 | 2.8 |

Table 3-1 Average Scores of the Existing Products Evaluation, Youth Group

According to the results above, the design of products seems to follow the elderly's preferences. While the youth preferences obtained from the survey could be used in the package design of related products, in this thesis only the product design will be discussed.

⁵ All the pictures of the existing products are collected from magazines and the internet. Please refer to Appendix 3 for reference resources.

| | Reliable | Comfortable | Simple | friendly | natural |
|------------|----------|-------------|--------|----------|---------|
| Product 1 | 3.25 | 4.25 | 4.5 | 3.5 | 3.5 |
| Product 2 | 3.75 | 3.25 | 3.75 | 4 | 3.5 |
| Product 3 | 3.75 | 4.5 | 4.75 | 3.5 | 3.25 |
| Product 4 | 3.75 | 3.75 | 4.25 | 3.25 | 3.75 |
| Product 5 | 4.5 | 4.75 | 4 | 3.75 | 3.5 |
| Product 6 | 3.5 | 3.75 | 3.5 | 4 | 4.5 |
| Product 7 | 4 | 3.75 | 4.25 | 3.75 | 3.75 |
| Product 8 | 4.5 | 4 | 4.75 | 4 | 4 |
| Product 9 | 4.25 | 4 | 4.25 | 3.75 | 3.75 |
| Product 10 | 4 | 4.25 | 4.75 | 3.75 | 4 |
| Product 11 | 4 | 4 | 3.75 | 4 | 3.75 |
| Product 12 | 3.75 | 3.75 | 3.5 | 4 | 3.75 |

Table 3-2 Average Scores of the Existing Products Evaluation, Younger Elderly Group

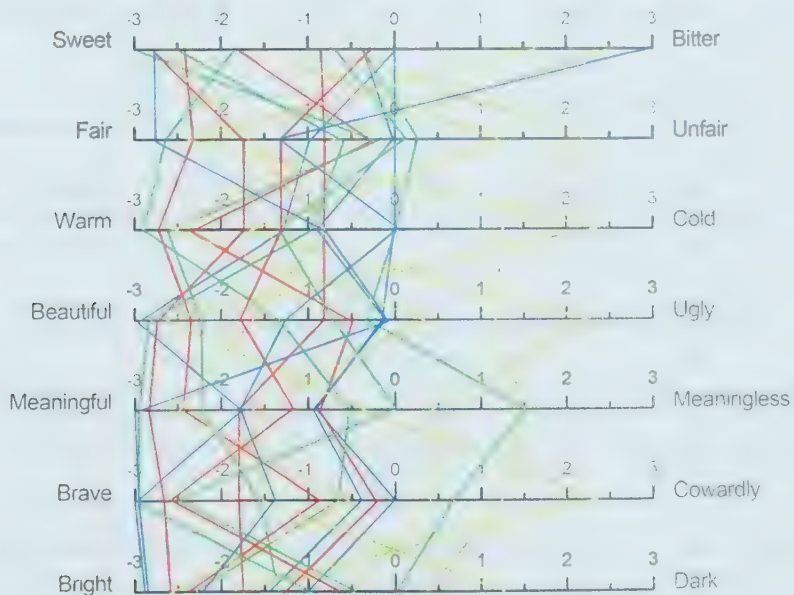


Table 3-3 SD scale summary of fivey final kansei words, Younger Elderly Group The different colours represent the answers of different participants.

It is clear from the elderly's FKW SD scales that all five kansei words generally trend toward the left end of the scales (see Table 3-3), which means the polylines are placed in the negative area of all seven scales. However, the distribution of the polygons is not quite unified.

| | | reliable | comfortable | simple | friendly | natural |
|------------------------|---------|----------|-------------|--------|----------|---------|
| Sweet-bitter | Average | -2.70 | -0.50 | -0.48 | -1.50 | 0.93 |
| | Standev | 0.14 | 2.12 | 0.36 | 1.15 | 1.67 |
| Fair-unfair | Average | -1.68 | -1.38 | 0.43 | 0.00 | -1.68 |
| | Standev | 0.78 | 1.27 | 1.32 | 1.04 | 1.43 |
| Warm-cold | Average | -1.05 | -2.18 | 0.15 | -1.95 | -0.15 |
| | Standev | 0.45 | 0.93 | 0.91 | 0.60 | 1.77 |
| Beautiful-ugly | Average | -1.83 | -0.83 | 0.05 | -0.85 | -1.60 |
| | Standev | 1.18 | 1.35 | 0.87 | 2.33 | 0.76 |
| Meaningful-meaningless | Average | -2.75 | -1.40 | 0.10 | -1.13 | -0.88 |
| | Standev | 0.21 | 0.84 | 1.65 | 1.21 | 0.77 |
| Brave-cowardly | Average | -2.33 | -0.83 | 0.03 | -1.08 | -0.37 |
| | Standev | 1.15 | 0.48 | 1.33 | 1.45 | 2.41 |
| Bright-dark | Average | -2.28 | -0.83 | -0.60 | -1.25 | -2.30 |
| | Standev | 0.85 | 1.56 | 0.92 | 1.14 | 0.37 |

Table3-4 Elderly SD, (data is calculated based on the Figures A-1, A-2, A-3, A-4, and A-5 in AppendixII

According to Table 3-4, the world reliable has the most close opinion from different people, because the standard deviation in 3 SD scales is lower than 0.5; the other words only have one lower standard deviation scale or none. Thus, my design features are primarily based on the “reliable” aspects. Through those three scales, the feeling of reliable can be described as *very sweet* (-2.7), *fairly warm* (-1.05), and *extremely meaningful* (-2.75; see Table 3-3). I referred to existing products with more extreme scores (absolute value equal or higher than 4) and lower standard deviation (equal or lower than 0.5) in order to deduce the design implications of *reliable*. Products 8, 10, and 11 were selected. In addition, Products 8 and 10 have higher scores and lower standard deviations in *comfortable* and *simple* as well. Therefore, Products 8 and 10 would be the most important reference for my design.

Product 8 is designed by a design firm LKK in Beijing, and the Product 10 is a Japanese brand. Both of them have large-diameter rounded corners and look very solid and strong. Product 8 is available in the following colours: burning orange, grass green, light green, carnation, and violet. Product 10 is only available in gray. The primary materials used in fabrication are various plastics polymers. The texture applied is a matte finish. There are only 2–4 buttons on the control panel, and the buttons are placed beside the output screen. From the pictures we see the interfaces are very clear and simple.



Figure 3-2 Product 3



Figure 3-3 Product 5



Figure 3-4 Product 6

The word *comfortable* has low standard deviation in the brave–cowardly scale, according to Table 1 in Appendix 2. Products 8 and 10 are the products that have higher scores and lower standard deviations. For the same reason, Product 5 was selected as well. By the same rule, Products 3, 5, 8, and 10 were found to match the FKW *simple*, and Products 6, 8, and 11 were found for FKW *friendly*, but none of the products match the score for *natural*.



Figure 3-5 Product 8

Product 11, selected by *reliable*, is another design by LKK in Beijing. The colour used in the material is very bright, and it has a backlight that changes colours based on the output. Product 5, selected by *comfortable*, is a thermometer designed for children. The unusual shape is not designed just to be fun or good-looking, but for ergonomics and ease of holding under the arms by children. Product 3, selected by *simple*, is a simple-looking remote thermometer. There is only one control button, and the colour of the backlight can change depending on the output, as with



Figure 3-6 Product 10

Product 11. Product 6, selected by *friendly*, is a hearing aid. Unlike the other products examined, this design is composed of curves only. The primary curve of the product fits the shape of the ears. Bright colours are used in this product and the user can choose the colour by changing the shell.

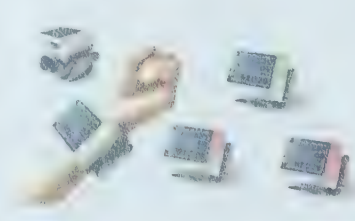


Figure 3-7 Product 11

Based on this analysis and my inherent research interests, I have decided to design a medication collector, which is a low-tech product, and a digital healthcare monitor, which is a high-tech product.

3.6 General Design Features

According to the analysis above, the home healthcare products should have the following features: Rounded and solid shape; bright and warm colour; clear interface and very simple, button-based operation; and multiple outputs. All of the designs must be physically human-centred. Aesthetics will be considered as a secondary consideration, with fashionableness and gracefulness being the focus.

Chapter 4 Medication Collector Design Process and Comparison

4.1 Detailed Design Features and Comparison

4.1.1 Scenario and Persona

Song Zhimin, my mother's uncle, retired for 10 years, living with his wife in Beijing for 40 years. Their son is in Beijing as well, but not living with them. Zhimei has suffered from high blood pressure and heart disease for several years, and he needs to take three kinds of pills everyday, in addition to some health supplements. He was tired of the repetitive "bottle open, bottle close" actions.

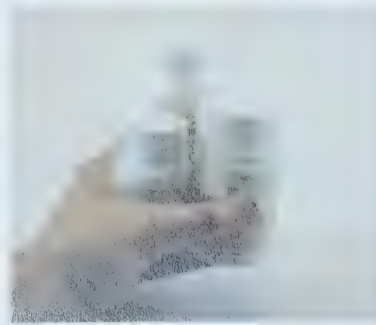


Figure 4-1 Initial Concept, (Photo taken by Song, R., 2009)

4.1.2 Design Features and Functions

Functions: Flexible organizer to store pills or health supplies.

Target people: Middle-aged to elderly

Design focus: Actual production structures, materials, flexible use but simple function, human dimensions.

Design features: Feasible for the new *younger elderly* market, universal, and low cost. Designed for those who have trouble with taking numerous pills.



Figure 4-2 Sketch of Medication Collector

4.1.3 General Look and Materials

This product is for the storage of different pills or medications. The initial concept comes from the idea of holding several medication bottles at a time, which can be seen in Figure 4-1. The bottom part will hold four small individual containers, with a different container for each medication. There will be a large cap and four small caps. The large cap will cover all of the four bottles, and there are four small caps on top of the big cap (see Figures 4-2 and 4-3). The user can take off the entire cap to refill the pills, and open the

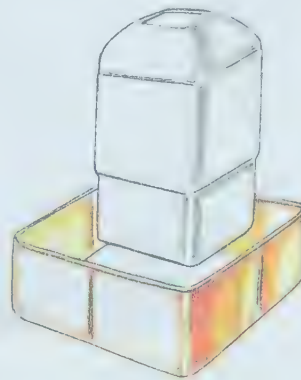


Figure 4-3 Sketch of Medication Collector

small cap to take individual pills. The entire product will be made from thermosetting plastic. The bottles will be transparent or semi-transparent. Striking colours, which are close to the primary or secondary colours, will be used for both the cap and the bottom, in order to differentiate the collector from its surroundings, as this is critical for the aged. Striking colours are more easily recognizable and are easier to remember.

The length of the bottom edge is 60mm, which makes the collector easy to hold in one hand, and the large rounded corners should make the holding more comfortable. Both the bottom of the collector and the cap are friction bonded to the bottles. The smaller caps are

very easy to open because of the hinge and the gap underneath the small caps. The other advantage of this design for the caps is that they will not easily fatigue with repeat opening and closing, unlike the caps of shampoo bottles.

To help reduce operational errors, all of the edges for each container are rounded. Therefore, every container can be placed in the bottom more easily and freely, as shown in Figures 4-4 and 4-5. The final design can be seen in Figure 4-6, which is a digital model built in Rhino 4.0 and rendered in Hybershot.



Figure 4-4 Container with one rounded edge



Figure 4-5 Container with all four edges rounded

4.2 Comparison and Evaluation

The prototype of the design can be seen in Figures 4-7 and 4-8. These prototypes are made out of painted ABS, are built using CNC cutting, and are fully functional. In order to reduce the cost of the prototype, the containers were made from solid coloured plastic instead of transparent materials. The bright yellow and light gray colour, the solid tube look, and the big rounded corners were all based on the general design features. The size of the entire



Figure 4-6 Rendering of Medication Collector

collector is designed for easy holding (see orthographic in Appendix 3). The tabs under each small caps are helpful for opening. These features can be linked back to the final kansei words.

In addition, manufacturing considerations are fully incorporated into this design. The small containers can be made by blow moulding, and the other parts can be made by injection moulding. Limited moulds are required, because this design is modular, with only four different parts. Therefore, the manufacturing costs will be minimized.

This design fully matches the design purpose: Not only were the design features based on the final kansei words incorporated, but so were the design features stemming from the persona, scenario, and the target market.



Figure 4-7 Prototype of Medication Collector (Photo taken by Song, R., 2010)

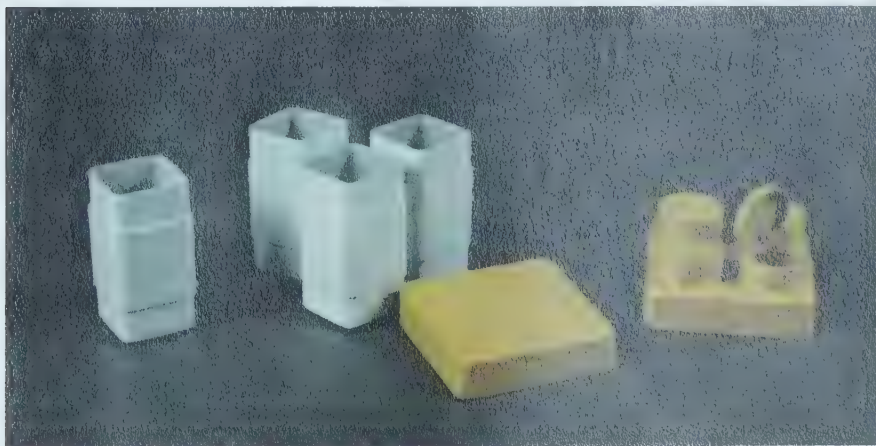


Figure 4-8 Prototype of Medication Collector (Photo taken by Song, R., 2010)

Chapter 5 Home Healthcare Digital Assistant Design Process and Comparison

5.1 Detailed Design Features

5.1.1 Scenario and Persona

Zhang Zhihou, 68, retired from his position at a university for several years, living with his wife and children in Jinan. He has five home healthcare products at home. His collection of devices results in messy wires, and the products are poorly laid out. He wishes that a design would bundle all of his healthcare products together to avoid the mess of wires and clutter.

5.1.2 Technology support

Due to the limitations of the health insurance system in urban China, it is not realistic to transmit the data from Zhang's devices to either the doctor, the relevant caregiver, or relatives such as the children of the aged. However, it is still necessary to design a home healthcare digital assistant that is connected to each healthcare product to collect data. This digital assistant can be a super-multifunctional home healthcare product, which can provide several functions for every member of a family. To some extent, this product is conceptual and expensive, since various high-tech applications are involved in its design. With this consideration in mind, the aesthetics will be matched to the expensive price.

Through a variety of available technologies, it is possible for digital assistants to collect data from every single healthcare product and send them out to doctors, relatives, or anyone else. In this way, a user of the health digital assistant could be monitored at all times, and doctors could track the data input as well. As mentioned above, due to the dysfunctional health care system in China, this conceptual design would need some time to gain market acceptance, but it is nonetheless promising.

5.1.3 Design Features and Functions

Target Group: *Younger elderly*, home use, families concerned about their quality of life, and families in higher economic brackets.

General Functions: Integrated multifunctional, equipped with wireless internet, fully automated control, flash memory, easy access and friendly interface. It could be connected to a variety of the home healthcare products by wireless or USB. Furthermore, it would have a remote thermometer, blood pressure monitor, and blood glucose meter integrated into the system with an arm cuff as an accessory.

Design Focus: Control panel, aesthetic appearance, interface design. The interface would be the most important part of the design.

According to the design features mentioned in section 3.6, the input and output aspects would need to be considered.

5.1.4 Input and Output Interface

There are a variety of input methods used in electronic products, the most commonly used being buttons, touch screens, and touch pads. These three input methods have both advantages and disadvantages (see Table 5-1).

Overall considerations for the design features, as based on the survey results, include: buttons must be large, device must be easy to access, and it must connect to the matching output.

The ATM user interface design is a very good example of creating a connection between buttons and a display. All buttons for function options are adjacent to the items

displayed on the screen, which makes the device very easy to understand and operate, even for first-time users.

| | Physical Energy Consumption | Physical Feedback | Connections to the Output |
|---------------------|---|--|--|
| Touch Screen | Low | Little. Audio or visual feedback are commonly used as a complement | Directly connected to the output on the screen |
| Touch Pad | Low | Little. Audio or visual feedback are commonly used as a complement | Indirectly, can be improved through UI design |
| Button | From low to high, depending on the material and mechanism | Clear, as a movement was involved | Indirectly, can be improved through UI design |

Table 5-1 Comparison of Different Input Methods

5.2 Concept 1

Following the principles of *natural* and *comfortable*, a home healthcare product needs to smoothly merge into the interior instead of being perceived as an artifact of high-tech “equipment”. Therefore, the first concept to consider is the appearance of the digital assistant as a piece of furniture in the home. Based on the functions and the design features defined in the previous chapters, one concept would be to give the device the appearance of a picture frame with a base. The cap of the kit would be the screen, and the

space for accessories such as arm cuffs, blood glucose strips, and medications would be inside.

As with digital frames, the screen is in the centre of the cap panel. Rounded corners and appropriate colours are applied: typical furniture colours such as dark yellow, brown, and warm dark gray. Only two buttons are required for this design, and are positioned centre bottom beside the screen. At the bottom of the cap panel, a bump or a different texture is used to indicate the way that the cap is to be opened. The back of the device is where the power cord and storage for the chips and memory are located. Thermosetting plastic is the primary material used for this product, with a leather texture applied on both the cap panel and the kit.

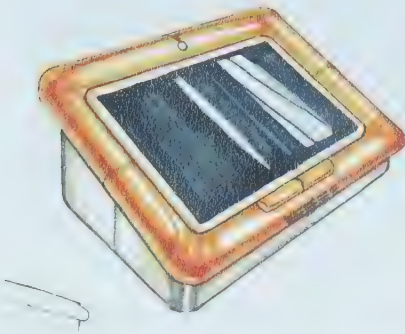


Figure 5-1 Sketch of Concept 1

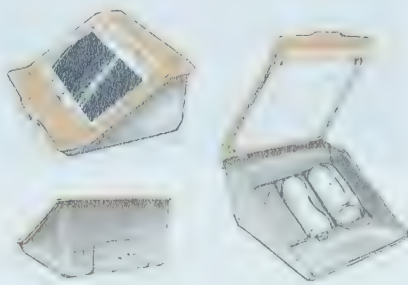


Figure 5-2 Sketch of Concept 1

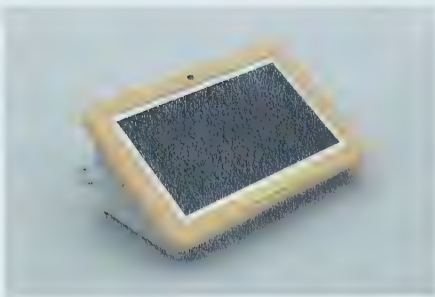


Figure 5-3 Rendering of Concept 1

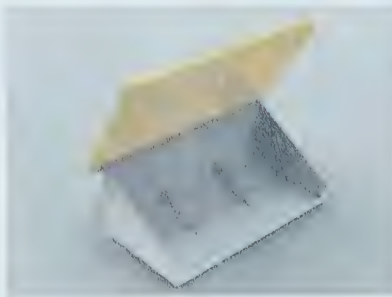


Figure 5-4 Rendering of Concept 1

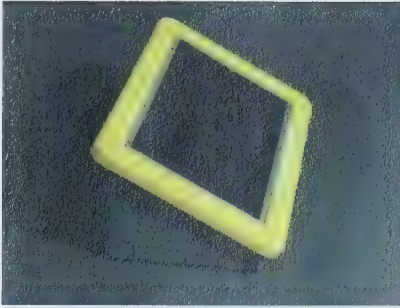


Figure 5-5 Prototype of Concept 1 (Photo taken by Song, R., 2010)

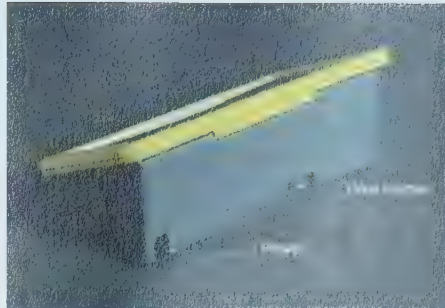


Figure 5-6 Prototype of Concept 1 (Photo taken by Song, R., 2010)

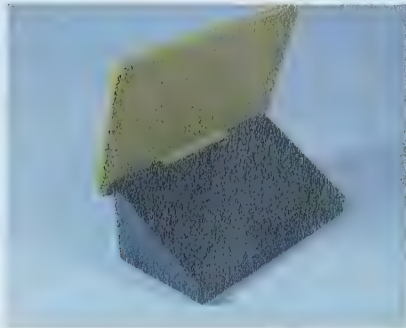


Figure 5-7 Prototype of Concept 1 (Photo taken by Song, R., 2010)

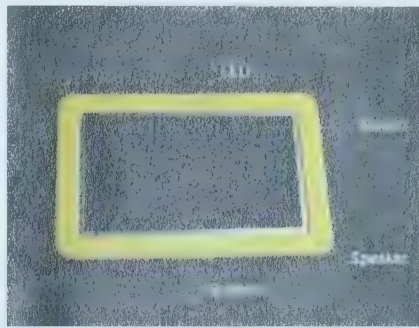


Figure 5-8 Prototype of Concept 1 (Photo taken by Song, R., 2010)

The interface of this design is simulated in the PowerPoint slide included in Appendix 3. All functions can be operated through two buttons. The final rendering can be seen in Figures 5-3 and 5-4, which are digital models built in Rhino 4.0 and rendered in Hybershot. The full-size prototype can be seen in Figures 5-5, 5-6, 5-7, and 5-8, and is made out of painted ABS using CNC cutting. It is not fully functional but shows the appearance and the size.

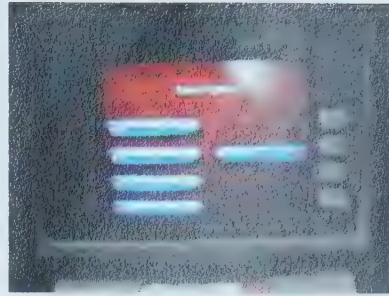
5.3 Concept 2

The appearance of the device is inspired by a combination of a steering wheel and fitness equipment. A variety of materials are used. Unlike Concept 1, this design does not have a space inside for storing accessories. All the data from other sources would be connected through one of the recesses on the bottom. This concept has 8 buttons in total, placed

alongside the screen, as with an ATM interface, which is recognized globally (see Figures 5-9 and 5-10). The final rendering pictures and prototypes can be seen in Figure 5-11, 5-12, 5-13, and 5-14.

5.4 Comparison and Evaluation

Overall, the appearances of both concepts generally meet the purpose of the design. Concept 1 has a look similar to a frame or a piece of home furniture, whereas Concept 2 looks very dynamic due to the curves used for the outline. Neither of them gives the impression of a piece of equipment, but they do appear reliable, comfortable, friendly, and natural.



*Figure 5-9 A Typical ATM Interface
(Photo taken by Song, R., 2010)*

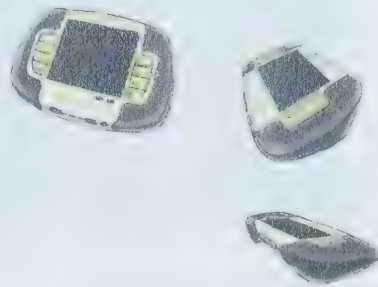


Figure 5-10 Sketch of Concept 2

The colours selected conform to my analysis of the final kansei words and related existing products evaluations. The series of yellows used in Concept 1 and greens used in Concept 2 are relatively brighter and warmer. According to what was discussed in section 5.1.2, wireless technologies are applied in both of the two concepts, in order to reduce the complex of wires. Concept 1 is hollow inside, although the large, rounded corners enhance the solid- looking feature. The design of the buttons, including their sizes, position, and shape, are base on ergonomic principles. The rubber grip and paint finish used in the handle areas and buttons in Concept 2 will make the surfaces feel much more like leather. However, due to the limitation of software, the interface designed for Concept 1, as simulated in PowerPoint, cannot be displayed to its full advantage.



Figure 5-11 Rendering of Concept 2

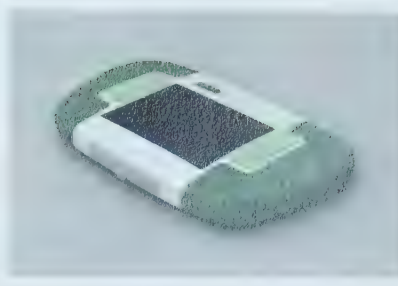


Figure 5-12 Rendering of Concept 2

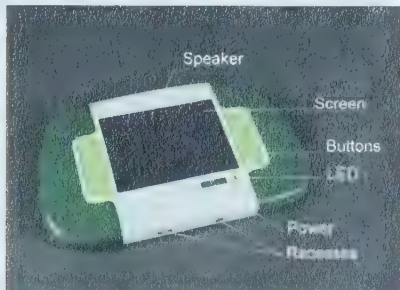


Figure 5-13 Prototype of Concept 2 (Photo taken by Song, R., 2010)

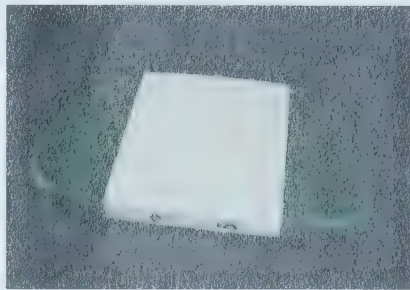


Figure 5-14 Prototype of Concept 2 (Photo taken by Song, R., 2010)

Part 3 Conclusion

Chapter 6 Conclusion and Recommendations

Designers and engineers often have difficulty communicating. In my experience, I have found KE to be a valuable platform for coordinating designers and engineers. Standard KE is an accurate and rational methodology for producing design specifications. Simplified KE has both rational and perceptual factors, and it is more accessible to designers. It helps designers explain the logic of design concepts to engineers.

The design practice process in this thesis follows simplified KE. All the design components, including colour, outline, and shape, were determined through the use of kansei words. The entire process can be considered as follows: collection (kansei words)→summarization(final kansei words)→analyses (SD scale and existing product evaluation)→a second summarization (design features)→design. Ideally, the designs should also be assessed by the target group.

The simplified KE developed by this thesis is much more accessible to small design businesses than traditional KE. This methodology not only provides a way to design a more psychologically pleasurable product, but also provides advice on building surveys and research models.

However, simplified KE is far from mature. On the one hand, there is risk involved in using simplified KE. The survey process will not always result in usable concepts. For example, one of the primary design features listed was *comfortable*, but there was no existing product that had a score relevant to this feature. The result is that the selection of the existing products for evaluation all depends on the designers' opinions of these

features. The best way to minimize this risk is to select existing marketed products, and to add more products into the survey. Also, the processes of simplified KE are still based on the designers' intuition, especially in the data analyses processes. The matrixes used in the data analyses are not visual; in other words, this information is not easy to read. If it is possible, I would like to make the evaluation and data analysis more visual, replacing the matrixes.

KE is a very complex method for design. I plan to involve myself in this field, with the purpose of making design processes more scientific and more accessible. I would recommend that a varied group of researchers be involved in this project if I were to redo it. Researchers in linguistics, statistics, and computer science would be most useful. Through group collaboration, this study could achieve more accurate results.

Appendices

APPENDIX I. Ethics Application

UNIVERSITY OF ALBERTA

FACULTY OF ARTS, SCIENCE & LAW RESEARCH ETHICS BOARD

APPLICATION TO CONDUCT RESEARCH

INVOLVING HUMAN PARTICIPANTS

Principal Investigator(s):

Name(s): Ruiling Song

Department/Faculty: Dept. of Art & Design, Faculty of Arts

Campus Address: #005, Industrial Design Studio

Campus Phone number: 780-4924195

E-mail address: ruiling@ualberta.ca

(If student)

Name / Department of Faculty Supervisor / Sponsor : Robert Lederer, Dept.
of Art & Design, Faculty of Arts

Supervisor's E-mail address: Robert.lederer@ualberta.ca

Supervisor's Campus Phone number: 780-4926367

Project Title: Design and research home-based compact health care devices for urban people aging 60-70 in China.

Funding Source(s): None

Summary of Project / Research Design. Please attach a more detailed proposal (i.e., 1-2 pages), including a description of the population from which research participants will be drawn (e.g., university students, nursing home residents) and a discussion of how research participants will be solicited. Also attach copies of research instruments (e.g., questionnaires, interview guides).

This project is focusing on the interact between the home-based compact health care devices and their users, the aged people in urban area in China, and then design and improve related products based on the result of the survey. The rough sets model of Kansei Engineering will be used through out the whole project.

Nowadays, the absolute and the relative numbers of aged people all over the world increased sharply, no matter in developed countries or developing countries. What worse, many people worry that an aging population will put a extra burden on our society with the rising health care costs. The existing health care services can not the meet the increasing needs of the aging population. It is an efficient method to let those interested in tracking their health or essential to be tracked to do it at home. And it is possible to buy a low-cost functional digital health monitoring devices for the surge of commoditization of consumer electronics.

Even numbers of aspects have been well improved for these series of products, such as multifunction, physical pleasure, psychological pleasure as so on; my project is concentrated on the aged people - the group of people with the most of potential to use relative products. The main purpose of my project is to design and improve not only the physical aspects but also the emotional aspects for the series of products. Further more several contradiction aspects should be discussed and improved based on the results of survey. One of the typical contradiction is people tend to use smaller-sized products but that means the display will be smaller and hard for the aged people to read, even make the size larger, it would be too large to ignore from one's appearance because nobody want to tell the others "I was suffered by cardiopathy" by a obvious large heart rate monitor.

As a whole, my project will be developed in three stages.

1. General survey: the general survey has been divided into 3 sections: expert interview, conversation with target group, and seminar class discussion. The expert interview include

professional designers and surgeons, the conversation will involve 6 people aged from 60-70, and the seminar class will be taken in a workshop founded by ICAU * of which I will be an instructor.

ICAU (International China Art Union), which is the founder and sponsor of the Industrial Design Workshop in Beijing, is a registered non-profit charitable association aiming at providing various benefits to the Chinese student and artists.

2. Product design and improvement: based on the results of the survey I will design or improve 3 pieces of home-based compact health care devices with different functions.
3. Prototype testing with target group: the prototypes of my design will be tested by the results of rough sets model of Kansei Engineering got from first stage. The ethics application for this stage will be submitted after the prototypes are finished.

Assessment of Risk to Human Participants:

The risk for the expert interview and class discussion is little. There isn't any topic related to upset. Peter Gao, the minister of ZTE Corporation ID Center UCD Department, with whom I will interview, is familiar to me and greatly welcomes me to meet him in early Dec. Ethan Chen is a Phd candidate in Shandong University majored in biomedicine, he has already helped me asked 3 experienced doctors for my interview. And the topics of my interviews are based on general experience neither sensitive nor abstruse. The experts will select the day, time and the place for meeting for their convenience. Each interview will last approximately one hour.

The students' participation in the seminar class discussion is voluntary and every student will be informed of the project's topic, purpose, location and time lasts prior to the class.

The conversation with target group will be a few of risks because my focused group is aged people and they potentially hard to cooperate and communicate for some physical reasons. Therefore, an invitation will be hand out to ask for participants.

Description of Procedures to be undertaken to Reduce Risk to Human Subjects.
Please attach copies of consent forms and other similar documents.

Semi – structured questions for the expert interview

The questions of the interview concern that concept on the use of home-base monitors for the aged, existing products, and their expectation of the application and improvement of related products. I would like to keep an audio record for our conversation if they permitted; if not I will just making notes as we go. If I use the content of their comments in my thesis, or cite any portion of our conversations, or mention their name in any way I will submit the draft text to them request their permission or just discuss about this issue at the end of the interview.

For the target group conversation, I've asked one of my friends, Haining Bi, to help me to ask for participation and do some conversation preparation. She works in design domain and has a lot of research experience for the aged people. In terms of the characteristics of the aged people the questionnaire is special designed by making the use of larger font, more images other than just characters, and the participants can choose their favorite method, orally or written, to answer the questions.

For the data collected, including in the workshop, in the expert interview and in the target group conversation, will be kept by myself till my thesis finished. And the data might be kept together with my thesis if necessary. Or I will keep the data for future academic research. Additionally, the audio record obtained in the workshop will be kept by ICAU as well as educational record and academic use only.

I have read the UNIVERSITY OF ALBERTA STANDARDS FOR THE PROTECTION OF HUMAN RESEARCH PARTICIPANTS [GFC Policy Manual, Section 66] and agree to abide by these standards in conducting my research.

Signature of Principal Investigator(s)

Date

(If Student)

Signature of Faculty Supervisor/sponsor

Date

Detailed proposal

I. Proposed Title

No One Want to Be Forsaken by the Age –Applying Kansei Engineering to the Design for the Aged

II. Introduction

During the twentieth century, the absolute and the relative numbers of aged persons all over the world increased sharply especially after world war two, no matter in developed countries or developing countries. This change in age structure has brought on a great interest in the social, economic, medical, and psychological factor.

Most of existing design theory or methodologies studies, are focused on physical pleasure design, such as physically comfortable, barrier-free for the aged, special function needs etc. But during the recent 20 years, more and more research has raised the level the people's pleasure with the products. Social identity, sensory impressions, self-value etc. are all considered as design factors. Nowadays the design theory research is much more about "spirit" rather than "body".

With the developing of the science and technologies and the improvement of living level, modern medical has deeply influenced our everyday lives and life expectancy rises. Certainly, the living conditions of the aged persons are improved also. Based on the population stat. not only the population of aged 65 and over is larger but that 75 and over is much larger than before. So it is very necessary to do some research on the "spirit" of the aged. They are healthy enough to take care of themselves even they are seventy years old.

Demo:

There is a very special consumption behavior around the aged persons in China urban areas. They are healthy, at least can take care of themselves, and have purchasing power to some extent, compared with the living condition and income 30 years ago. What was confused, the aged persons would love to receive what they need from their children as gifts rather than purchase by themselves, even the gifts are kind of useless for them. It is much worse that if they received money from their children that they will accept the money with a happy smile and followed by a shame deep sigh.

According to some individual interviews, the similar thing is happening in other developed countries; even the universal design in developed countries is more accessible and comprehensively applied.

Demo Analysis:

Every one must be very glad to receive gifts from others, because that represents that he or she is under someone's thoughts. And they have good relationship with their friends, community even the society. So they are not lonely and ignored, they are live in a same world as the young adults. When the seniors received something from their children it is not only a kind of cognition of "in", I think, but also a happiness of harvest and family care.

For everyone getting older, but nobody would like to admit they are old. When it comes to the people just retired from their job, they were used to devote themselves to their family, to this society; a feeling of lost comes up. Besides of family care, they need to prove that they are still useful to this family and society. The money received from their children will make them feel they are burden of the family and the society.

III. Target Group of People

Urban residents, ageing from 60 to 70, retired from their jobs. They have children and can rely on the pension to afford their lives. They are healthy enough to take care of themselves even they are seventy years old.

IV. Purpose:

- 1) Based on the method of Kansei Engineering, building a simplified model for design products for my target group. The simplified Kansei Engineering model generally refers to both the physical aspect and the emotional aspect like measurements, materials, feelings, etc.
- 2) Design or improve 3 pieces of home-based compact health care devices with different function such as thermometer, blood pressure monitor, heart rate monitor.

V. Brief Definitions and Research review

Kansei Engineering is a method for translating feelings and impressions into product parameters. Kansei is a Japanese term where the syllable KAN means sensitivity and SEI means sensibility.

This method was invented in the 1970s by Professor Mitsuo Nagamachi (Dean of Hiroshima International University). Kansei Engineering can "measure" the feelings and shows the relationship to certain product properties. In consequence, products can be designed to bring forward the intended feeling.

Miata, which was developed mainly based on Kansai Engineering, is the most successful sport auto in the present market. Also Miata is the first product has made use of Kansei Engineering.

Recently, numbers of studies in wide range of products have been operating related to Kansei Engineering, such as user interface of cellphones, math-model for bicycle frames design.

It is obviously that this research needs a great deal of survey work. I have already contact with my connections in China and asked for volunteers, participants and experts with well feedback. Following, more works on survey and statistics is needed.

1) Target design work

According to available statistics I can make sense of what the aged persons usually buy for themselves and the trend of consumption habit. Depends on this, I selected home-based health care devices

2) Kansei Engineering

Kansei Engineering can show to what extent parameters have an affect on the impressions. A set of products sufficiently diverse to provoke a wide range of different impressions is required. The subjective responses resulted from the diversely products can be evaluated by using sets of bipolar attribute rating scales with a pair of opposed terms placed on a continuum represented as a line. Usually every different property or aspect of the products has a set of that scales with different impression lines. And the value of every property or aspect on the impressions of products must be considered and assessed. Interviewees will be asked to mark on that line to indicate where they think a product falls relative to the two attributes.

3) Study by using of simplified Kansei Engineering.

Kansei words collection can be finished in many ways: literature review, web research, expert interview, target group conversation and so on. As I mentioned in my demo the thoughts of the young people should be considered as well. Then a bunch of kansei word should be collected, grouped, integrated into approximately ten kansei words. Additionally, some images of existing products collected from same domain will be evaluated by the kansei words.

VI. Difficulties:

- 1) Even the Kansei Engineering has been successfully put into practical design and manufacturing, depending on the particularity of different products and target group of people, rebuilding a new measure model is required, which was composed of a series of bipolar attribute rating scales. The terms placed on the continuums must be tightly related to target reach.
- 2) Kansei Engineering can be considered as a design method; indeed it functioned as a measure during design process. But this measurement is based on individual subjective

experience; it can not be very precise. What more, depending on the limited time and labor resource I can only partially make use of the rough set model of Kansei Engineering to suit my research.

- 3) Are the aged happy or unhappy when they use products or environments which are specialized design for them? From that, suitable signs and interface will be selected for the upper design.

Target group consent form

The content in this consent form is the same as its Chinese edition.

This conversation is part of a master of design thesis in Industrial Design. The purpose of this conversation is to share and investigate the experience of using home-based health care devices in order to design or improve related products.

Your participation in this conversation is voluntary. The conversation will last no more than 2 hours and will include a questionnaire, a discussion. During the discussion, your comments may be recorded through notes and audio recording. Your comments including the information collected from the questionnaire may be quoted in research documents, presentations, or future papers, but all will be done in a way of anonymity.

The discussion would consist of the experience of purchasing and using home-based health care devices, the expectation of related products. This conversation will include discussion of some potentially negative, for instance everyone is getting older and everyone have a chance suffered by disease. If these or other topics will make you feel uncomfortable at any time, please excuse yourself from any activity or question. You are free you leave at any time.

I _____ agree to participate as a member of a participant for the conversation and as a respondent to questionnaires for the above research project conducted Ruiling Song, of the Department of Art & Design, University of Alberta..

I understand that the conversation is a part of a research project and my responses to questions during the conversation may be recorded and included in research documents. Presentations, or future papers, but will be done in a way that retains my anonymity.

Participant name

Date

Signature

Ruiling Song

Principal researcher signature

I _____ have received 50 Chinese Yuan as reward after this conversation.

Participant name

Date

Signature

Ruiling Song

Principal researcher signature

Design for the aged seminar class description and consent form

This Project is part of a master of design thesis in Industrial Design. As an instructor in the ID workshop founded by ICAU, I want to involve my research work into one of the seminar classes.

Your participation in this class is voluntary. The class will last no more than 3hours and will include two questionnaires, a discussion, and a conceptual model creation. During the discussion, your comments may be recorded through notes or audio recording. Your comments may be quoted in research documents, presentations, or future papers, but all will be done in a way of anonymity.

The discussion would consist of the influence of aging of the population to design domain, what the aged people demand from the young peoples' perspective, and what the different living concepts between the aged people nowadays and 40 years later, when we are 60years old. Then a conceptual design model will be followed.

This seminar will include discussion of some potentially negative, for instance everyone is getting older and everyone have a chance suffered by disease. If these or other topics will make you fell uncomfortable at any time, please excuse yourself from any activity or question. You are free you leave at any time. Whether you will participate or not will not influence your grade.

I _____ agree to participate in the target group conversation and as a respondent to questionnaires for the above research project conducted by Ruiling Song, of the Department of Art & Design, University of Alberta.

I understand that the seminar is a part of a research project and my responses to questions during the class may be recorded and included in research documents. Presentations, or future papers, but will be done in a way that retains my anonymity.

Participant name

Date

Signature

Ruiling Song

Principial researcher signature

Design for the aged seminar class discussion topics and feedback questionnaire

Discussion topics:

1. Influence of aging of the population to design domain,
2. What do the aged people demand from your perspective,
3. What are the different living concepts between the aged people nowadays and 40 years later, when you are 60 years old?
4. Do you think your parents will be happier to receive the presents from you rather than money, what is the deep-seated reason for this?

Feedback questionnaire

Thank you for taking time to this discussion and help my research. I will be asking you a few questions about your experience in the seminar, please be candid and honest in your thoughts and reactions.

1. Did you find the class today is interesting?
2. Do you feel that participation in this class will increase your willingness of design for the aged?
3. What is your favorite section in this class?
4. Were there any elements in the class that you found difficult to understand?

Questionnaire for the target group conversation

Step1: an introduction of my research and this survey will be made (10 mins),

Step2: questionnaire (*English Edition*)(25min)

1. Your age: _____
2. Your gender: ___ Male ___ Female
3. What is your current living arrangement
 - a) ___ Live with spouse
 - b) ___ Live with spouse and child(ren)
 - c) ___ Live with child(ren) and no spouse
 - d) ___ Live alone
 - e) ___ Other, describe: _____
4. Marital Status:
 - a) ___ Married
 - b) ___ Common-law
 - c) ___ Divorced
 - d) ___ Widowed
 - e) ___ Never been married
5. Employment statuses:
 - a) ___ retired
 - b) ___ employed full-time
 - c) ___ employed part-time
 - d) ___ other, describe: _____
6. Do you have a home-based health care device:
___yes ___No
7. Who bought it for you?
 - a) Spouse
 - b) Child
 - c) Friend
 - d) Yourself
 - e) Other _____

8. Some times I feel I was a burden/useless to my family/children/society

- a) Strongly agree
- b) Agree
- c) neutral
- d) disagree
- e) Strongly disagree

9. Can learn how to use a new cell phone easily

- a) Strongly agree
- b) Agree
- c) neutral
- d) disagree
- e) Strongly disagree

10. I was able to hear the beep

- a) Strongly agree
- b) Agree
- c) neutral
- d) disagree
- e) Strongly disagree

11. I never mind others notice me wearing a health monitor

- a) Strongly agree
- b) Agree
- c) neutral
- d) disagree
- e) Strongly disagree

12. I usually forget take my medication/use the health monitor on time.

- a) Strongly agree
- b) Agree
- c) neutral
- d) disagree
- e) Strongly disagree

13. My children bought something for me would make my happy rather than gave me money.

- a) Strongly agree
- b) Agree
- c) neutral
- d) disagree

- e) Strongly disagree

14, please order the listed features from the most important to least important as a home-based health care device:

- a) Multifunctional
- b) Attractive/friendly appearance
- c) Comfortable to bring/wear
- d) Easy-operation
- e) Easy to receive the results
- f) Reliable quality
- g) Low-cost
- h) Modern

Order from the most important to least important _____

Other features you want to specify _____

15. What are the feelings do you considered should a home-based health care device bringing.

Select 5

Warm, cool, attractive, sweet, neat,
solid, lovely, meaningful, interesting, beautiful,
independent, fashionable, reliable, notable, easy-overlooked,
graceful,

16. What are the materials you prefer to touch **select 3**:

Plastic, metal, leather, wood, glass, fabric
any others _____

17. What are the output methods you prefer to get the information from a home-based health care device; **select 3**

LCD screen, voice, electronic sound, music,
Dial plate, column chart, sparkling light shaking
Any others _____

18. Which is the method you prefer to control a home-based health care device: **select 3**

- a) Touching screen
- b) Button
- c) Switch
- d) Voice,

e) Timing automatically

19. Which is the method you prefer to wear a blood pressure monitor to your arm/wrist? Why?

Strap and monitor integrated

Strap and monitor discreted

5min break

Step3: we will talk about the following topics. (20min)

1. The experience of using/ purchasing home-base health care devices.
2. The feeling of using a real-time health monitor. Do you feel embarrassed or nervous?
3. Describe the reason for the answers for the question 13,14

10min break (Kansei word collection and integration)

Step4: review the existing products and finish the questionnaire (20min)

Chinese Edition:

1. 您的年龄:
2. 您的性别: __男__ __女__
3. 目前, 您与谁一起生活
 - a) __配偶
 - b) __配偶和子女
 - c) __子女, 不和配偶一起
 - d) __独自居住
 - e) __其他, 请描述_____
4. 婚姻状况
 - a) __已婚
 - b) __离异
 - c) __丧偶
 - d) __未婚
5. 工作状况
 - a) __退休
 - b) __全职工作
 - c) __兼职工作
 - d) __其他, 请描述:_____
6. 你拥有意见或者一件以上的家用医疗产品吗?
__是的__件 __不, 没有
7. 是谁购买的该产品
 - a) 配偶
 - b) 子女
 - c) 朋友
 - d) 您自己
 - e) 其他, 请描述_____
8. 有时候我感觉我成为了家庭、社会或者子女的负担。
 - f) 非常同意
 - g) 同意
 - h) 中立
 - i) 不太同意
 - j) 非常不同意

9. 我能很容易地学会怎样用一个新手机

- a) 非常同意
- b) 同意
- c) 中立
- d) 不太同意
- e) 非常不同意

10. 我能够清晰地听见电子设备的嗡鸣声

- a) 非常同意
- b) 同意
- c) 中立
- d) 不太同意
- e) 非常不同意

11. 我不介意别人看见我随身携带健康监护设备

- a) 非常同意
- b) 同意
- c) 中立
- d) 不太同意
- e) 非常不同意

12. 我经常忘记按时吃药或者按时使用家用医疗监控设备

- a) 非常同意
- b) 同意
- c) 中立
- d) 不太同意
- e) 非常不同意

13 相比子女给我钱我更喜欢他们送给我一些东西

- a) 非常同意
- b) 同意
- c) 中立
- d) 不太同意
- e) 非常不同意

14 一下是家用医疗设备可能具有的特征，请按照您认为的重要性排序

- a) 多功能
- b) 吸引人的外观
- c) 佩戴舒适
- d) 操作简便
- e) 容易读取监测结果

- f) 可信赖的品质
- g) 价格低廉
- h) 现代时尚

请从最重要的特征到最不重要的特征排序: _____

您认为家用医疗设备应该具有的其他特征: _____

15 您认为下列那些感觉是家用医疗设备产品应该具有的. 请勾选 5 项

| | | | | |
|-----|------|-----|-----|--------|
| 温暖的 | 清爽的, | 冰冷的 | 甜蜜的 | 吸引人的 |
| 结实的 | 可爱的 | 灵巧的 | 有趣的 | 美丽的 |
| 优雅的 | 时尚的 | 可靠的 | 显眼的 | 容易被忽略的 |

16. 下列那些材料是你喜欢触摸的 请勾选 3 项:

塑料, 金属, 皮革, 木质 玻璃, 纺织品

其他, 请详细说明 _____

17. 您认为作为家用医疗监护设备, 哪种监测结果输出方式最合适;

电子屏幕, 语音, 电子声音, 音乐, 表盘, 柱状图,
闪烁灯 振动

其他, 请详细说明 _____

18. 当操作家用医疗设备时, 下列那种方式您更喜欢

- f) 触摸屏
- g) 按钮
- h) 开关转换
- i) 语音控制,
- j) 实时自动

19. 如果您有加用血压计, 当您使用时, 那种捆绑方式您更喜欢, 为什么?

捆绑带和血压计整合在一起

捆绑带和血压计不整合在一起

Questionnaire for both seminar class and group conversation:

Section 1:

Place the five integrated Kansei words, A, B, C, D, and E, in a scale of 7 points in the semantic differentials method.



Section 2:

Existing products evaluation by integrated Kansei words * : A, B, C, D, and E

Please mark every product * * you have seen from the images ranging from 0 to 5, 5 means best match the word, 0 means not match the word at all.

| | A reliable | B comfortable | C simple | D friendly | E natural |
|------------|------------|---------------|----------|------------|-----------|
| Product 1 | | | | | |
| Product 2 | | | | | |
| Product 3 | | | | | |
| Product 4 | | | | | |
| Product 5 | | | | | |
| Product 6 | | | | | |
| Product 7 | | | | | |
| Product 8 | | | | | |
| Product 9 | | | | | |
| Product 10 | | | | | |

| | | | | | |
|------------|--|--|--|--|--|
| Product 11 | | | | | |
| Product 12 | | | | | |

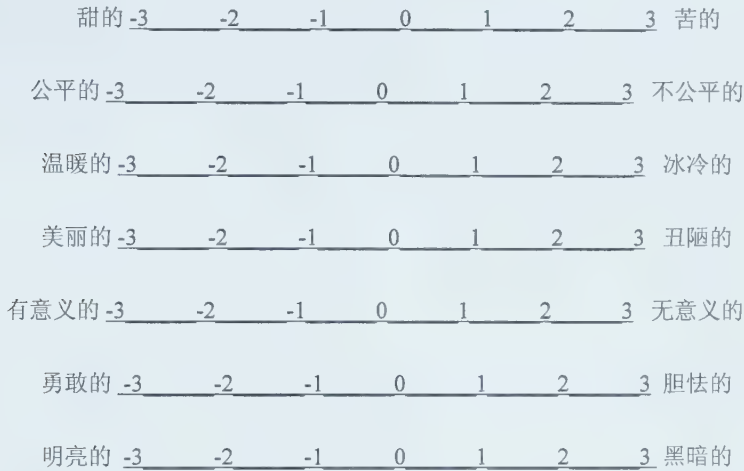
* Kansei words will be firstly collected from the expert interview, target group conversation. Then the words will be integrated into 5 words, usually adjective, to describe the products in the same domain. And the letters, A, B, C, D, and E are presenting of the 5 integrated Kansei words.

* * the products will be collected from magazines, internet, and pharmacy stores.

Chinese Edition:

第一部分:

请讲下列 5 个感性词汇,A 可靠, B 舒适, C 简单, D 友好, 和 E 自然, 根据您自己的感觉, 在拥有 7 个坐标的数轴上标记. (A, B, C, D, 和 E,) 来自于前期调研的总结。



第二部分

用感性词汇: A, B, C, D, 和 E 评价现有产品

请给您看到的每个产品在 A, B, C, D, 和 E 5 个方面打分, 5 分说明该产品充分符合该词汇的描述, 1 分说明完全不符合该词汇的描述。

| | A 可靠的 | B 舒适的 | C 简单的 | D 友好的 | E 自然的 |
|------|-------|-------|-------|-------|-------|
| 产品 1 | | | | | |
| 产品 2 | | | | | |
| 产品 3 | | | | | |
| 产品 4 | | | | | |
| 产品 5 | | | | | |
| 产品 6 | | | | | |

| | | | | | |
|-------|--|--|--|--|--|
| 产品 7 | | | | | |
| 产品 8 | | | | | |
| 产品 9 | | | | | |
| 产品 10 | | | | | |
| 产品 11 | | | | | |
| 产品 12 | | | | | |

Expert interview questions:

For professional designer:

What is your point view about the market for the aged people?

What are the main focuses when you design products for the aged? Have you do some special for the psychological demands of the aged people?

What is the most important aspect as a home-based health care device?

What is your expectation of the product design for the aged in the future?

For experienced doctors

Based on your professional experience, which group of people need to use health care monitors at home?

Will you suggest the people to buy a health care monitor if they need, or what kinds of monitor are usually used? Please specify their characteristics.

What is the most important aspect as a home-based health care monitor?

What is your expectation of the home-based health care device in the future?

Invitation

Dear Madam/Sir,

I am a graduate student in Industrial Design, and I am doing some research in home-based health care device design. If you are retired, aging 60-70, experiencing in using home-based health care device and have lived in urban area for long time. I hope you can participate in my survey and help me to finish part of my research work.

For the details of the content please refer to the “target group consent form”

Time: one day of 12, 13, or 14 Dec. 2:30-4:30pm

Location: A classroom in South campus of Shandong University (TBA)

(Miss Bi is my assistant in China, She will contact you as soon as the time and location arranged.)

Tea and Low-fat/sugar cookies will be served during the conversation and every participant will received 50 Chinese Yuan cash as rewards after our survey finished.

Please leave your contact information to Miss Bi if you would like to help us. Miss Bi will contact you as soon as everything is arranged.

Thank you for your support.

All best.

Sincerely

Ruiling Song

Letters :

Letters sent to Haining, translated from Chinese

Dear Haining,

Thank you for your help, for the Ethics application of my research I just need a confirmation from you. As I mentioned I just need you to work for me as an assistant. Your duty is handing out invitations and asking for 6 participants, arranging time and location, deleting all contacts information of the participants. I will pay you 200 Chinese Yuan for your work.

The time I prefer is one day between 12, 13, or 14 in Dec. 2:30-4:30, if we can rent a classroom on campus should be perfect, if can not could you please book a place, like hotel for me? I will pay the rent. The attachments are invitation and consent form, please hand them out and ask for participants to sign both the English and Chinese consent form.

Thanks again for your help.

Sincerely

Ruiling

ID Studio

Art & Design Dept.

U of A

Haining's response

Hi Ruiling,

I am trying my best. I will arrange them suitably. And delete the contact information of the participants after the survey finished.

Haining

Letters :

Letters sent to Peter Gao

Dear Mr. Gao,

As I contact you several days ago, there is the brief introduction about my research.

I am now starting my master thesis about design and research home-based compact health care devices for the urban people aging 60-70 in China. My focus is to improve both the physical and emotional aspects of the series of products, the mass production and the cost are excluded.

You have been as a professional designer for several years, and I need to talk with you about your concept on the design for the aged, existing products and market, your expectation of the related products.

Would you be willing to make some time, about 1 hour, on the 7, 8, 9, 10 of Dec.? If you would, I'll travel Shanghai to meet you.

Please let me know if you would be willing to see me.

Sincerely

Ruiling

ID Studio

Art & Design Dept.

U of A

Peter Gao's response

No problem. You are always welcome!

Waiting for your detail agenda.

Peter Gao

ZTE Corporation ID Center UCD Dept.

A105,#889 Bibo RD, Zhangjiang HI-TECH Park,Shanghai

TEL:86-21-68896837

MP :86-13918968373

FAX:86-21-50801070

Letters :

Letters sent to Ethan Chen

Dear Ethan,

As I contact you several days ago, there is the brief introduction about my research.

I am now starting my master thesis about design and research home-based compact health care devices for the urban people aging 60-70 in China. My focus is to improve both the physical and emotional aspects of the series of products; the mass production and the cost are excluded. I need to talk with some surgeons in related areas about their concept on the use of home-base monitors for the aged, existing products, and their expectation of the application and improvement of related products. May I bother you to introduce someone to me? Thank you.

I will be in Jinan on the 12,13,14,15 of Dec. and the interview just take 1 hour. If you find some surgeon would like to meet me, Please let me know. Thanks again.

--

Sincerely

Ruiling

ID Studio, Art & Design Dept. U of A

Ethan Chen's response

Dear Ruiling,

I am glad to write to you that 3 experienced doctors in my school hospitals are willing to be interviewed for your project, including

Dr. Liu Xujiu. MD, MS

Internal Medicine, Qilu Hospital, Shandong University

Professor Wang Bo. MD, PhD

Gynecology, Qilu Hospital, Shandong University

Associate Professor Geng Qingxin. MD, PhD

Cardiology, Jinan Center Hospital of Shandong University

Those doctors are experienced in clinical practice, and have all confirmed to attend your interview during your stay in China, from Dec 12 to 15. Besides, if you need, I will contact more doctors.

Sincerely,

Ethan, MD

Department of Medical Microbiology,

School of Medicine, Shandong University

Letters :

Letters sent to the Chair of ICAU

Dear Chair of ICAU

As a instructor in the ID workshop founded by ICAU, I want to involve my research work into one of the seminar classes-no one want to be forsaken by the age-design for the aged.

In the class, the students will know this class is part of a Master of Design Thesis in Industrial Design firstly, and a consent form will be hand outed to get the agreement. Then we will discuss the influence of aging of the population to design domain, what the aged people demand from the young perspective, and what the different living concepts between the aged people nowadays and 40 years later, when we are 60years old. Then a conceptual design model will be followed. The students will get familiar with the market of commodities for the aged, how to found out the way to design or improve a product for a unique group of people generally and how to design forward.

Also two questionnaires will be included, one is about design for aged people and the other is about each participant's experience in the workshop. Both ICAU and I hold the information obtained from this seminar.

Here, I need the permission of ICAU for me to put my research into my class. Thank you very much.

Sincerely

Ruiling

ID Studio, Art & Design Dept. U of A

Response

Hi Ruiling,

As instructor for 2008 winter ID workshop which ICAU sponsored at Beijing, you have the permission to design your syllabus and bring your academic research to enrich our workshop; in addition, you could select participants to join your project during class time.

Please let me know if you have any question,

Best regards,

Aihui Dong, Chair, ICAU

Washington DC

4F,Wantong Centre,Chaoyang,Beijing (China Office)

APPENDIX II. Survey Results and Data collection

i. Results from the questionnaire for the target group conversation (10 valid submissions) the number of the answers are following the corresponding options

1. Your age: 56-60:1 66-70: 4 71-75: 4 (one submission invalid)
2. Your gender: Male:7 Female:3
3. What is your current living arrangement
 - a) Live with spouse,9
 - b) , Live with spouse and child(ren),1
 - c) __Live with child(ren) and no spouse
 - d) __Live alone
 - e) __Other, describe: _____None_____
4. Marital Status:
 - a) Married,10
 - b) __Common-lay
 - c) __Divorced
 - d) __Widowed
 - e) __Never been married
5. Employment statues:
 - a) 8 retired
 - b) 1 employed full-time
 - c) __employed part-time
 - d) 1 other, describe: house woman
6. Do you have a home-based health care device:
Yes: 8 No:1, one submission invalid
2pieces; 2 3pieces: 2 , 4 piece : 1, 5 pieces: 3
7. Who bought it for you?
 - a) Spouse
 - b) Child: 3
 - c) Friend: 1

- d) Yourself: 5
- e) Other _____

8. Some times I feel I was a burden/useless to my family/children/society

- a) Strongly agree:1
- b) Agree: 2
- c) neutral : 1
- d) Disagree: 4
- e) Strongly disagree: 2

9. Can learn how to use a new cell phone easily

- a) Strongly agree: 3
- b) Agree: 5
- c) neutral : 1
- d) Disagree:1
- e) Strongly disagree

10. I was able to hear the beep

- a) Strongly agree: 4
- b) Agree: 6
- c) neutral
- d) disagree
- e) Strongly disagree

11. I never mind others notice me wearing a health monitor

- a) Strongly agree:3
- b) Agree: 7
- c) neutral
- d) disagree
- e) Strongly disagree

12. I usually forget take my medication/use the health monitor on time.

- a) Strongly agree
- b) Agree: 2
- c) Neutral: 1
- d) Disagree: 6
- e) Strongly disagree: 1

13. My children bought something for me would make me happy rather than gave me money.

- a) Strongly agree: 5
- b) Agree: 3
- c) Neutral: 2
- d) disagree
- e) Strongly disagree

14, please order the listed features from the most important to least important as a home-based health care device: (only the first selection was calculated)

- a) Multifunctional
- b) Attractive/friendly appearance
- c) Comfortable to bring/wear: 3
- d) Easy-operation: 2
- e) Easy to receive the results: 4
- f) Reliable quality: 1
- g) Low-cost
- h) Modern

Order from the most important to least important ____ None _____

Other features you want to specify _____ None _____

15. What are the feelings do you considered should a home-based health care device bringing. **Select 5**

| | | | |
|------------|--------------------|----------------|----------------|
| Warm,6 | cool, 4 | attractive,2 | sweet, 2 |
| neat,6 | solid, 6 | lovely, 0 | meaningful, 1 |
| 1 | beautiful,0 | independent, 1 | fashionable, 4 |
| notable, 4 | easy-overlooked, 2 | graceful, 1 | reliable, 10 |
| | | | interesting, |

16. What are the materials you prefer to touch **select 3**:

Plastic, 2 metal,3 leather,5 wood,9 glass,2 fabric,9
any others _____ None _____

17. What are the output methods you prefer to get the information from a home-based health care device; **select 3**

LCD screen, 5 voice, 5 electronic sound,1 music, Dial
plate, column chart, sparkling light shaking
Any others : multiple output

18. Which is the method you prefer to control a home-based health care device: **select 3**

- a) Touching screen, 3
- b) Button, 6
- c) Switch
- d) Voice,
- e) Timing automatically, 1

19. Which is the method you prefer to wear a blood pressure monitor to your arm/wrist?

Why?

Strap and monitor integrated: 8, reasons: easy-use

Strap and monitor discreted: 1, reasons: easy-use and easy to read the results

ii. Results of the SD scale evaluation from the young aged

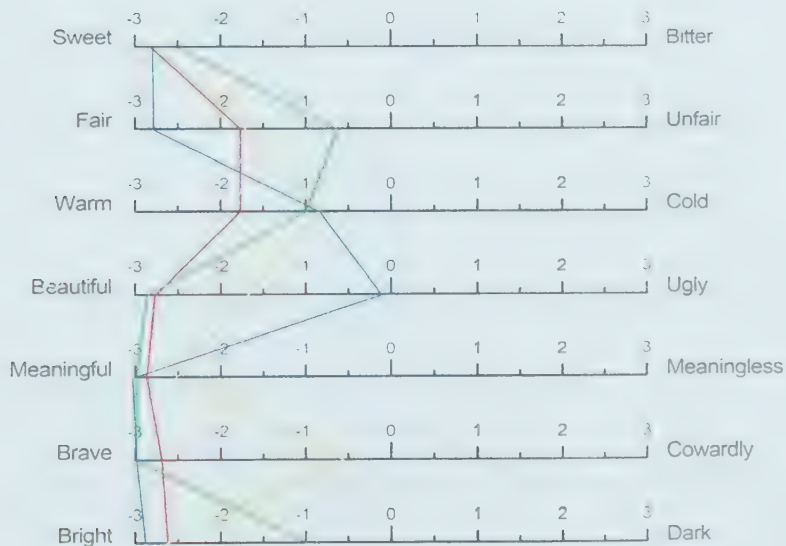


Figure A-1 Reliable SD from the aged

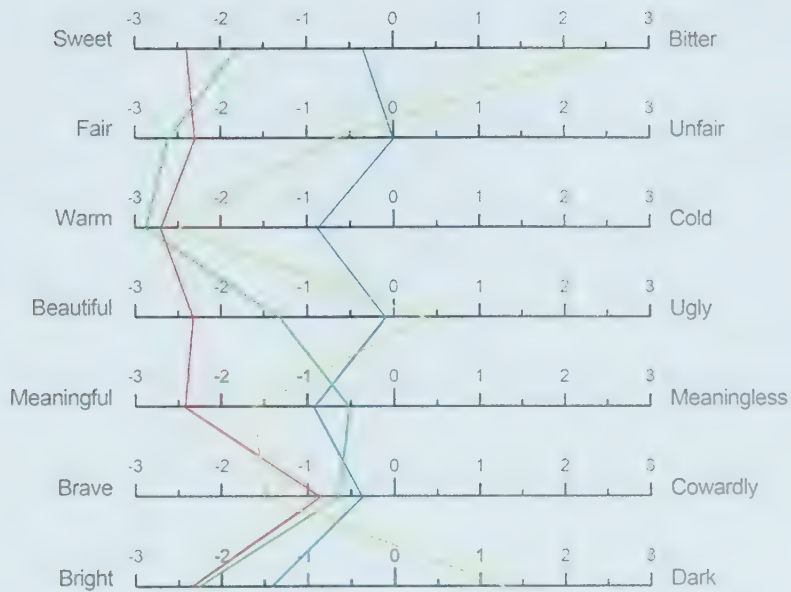


Figure A-2 Comfortable SD from the aged

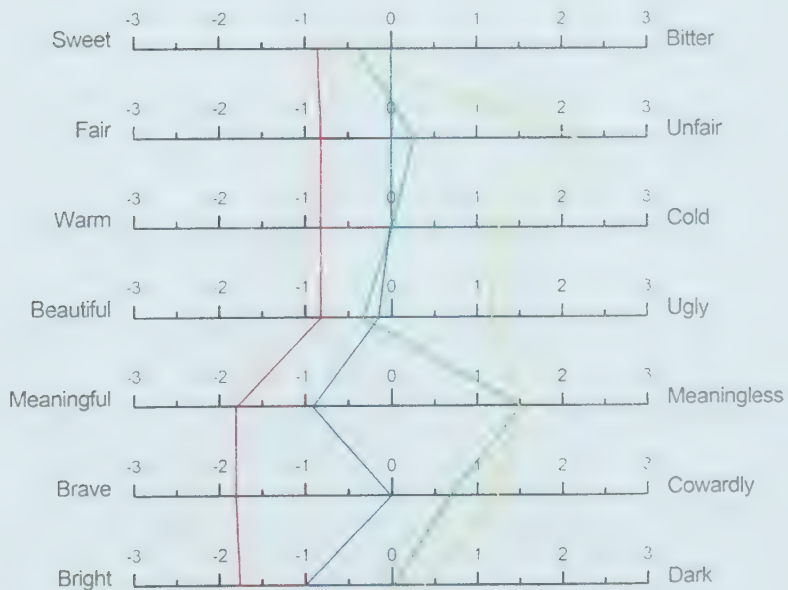


Figure A-3 Simple SD from the Aged

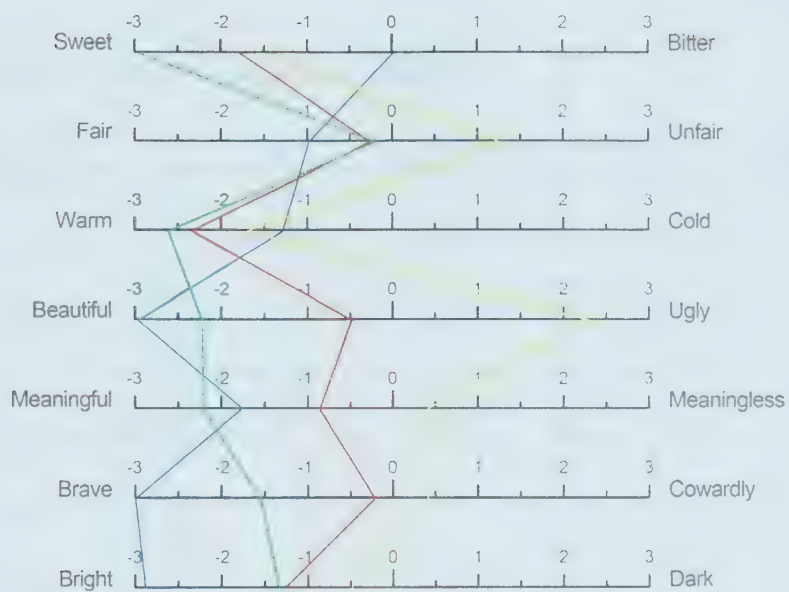


Figure A-4 Friendly SD from the aged

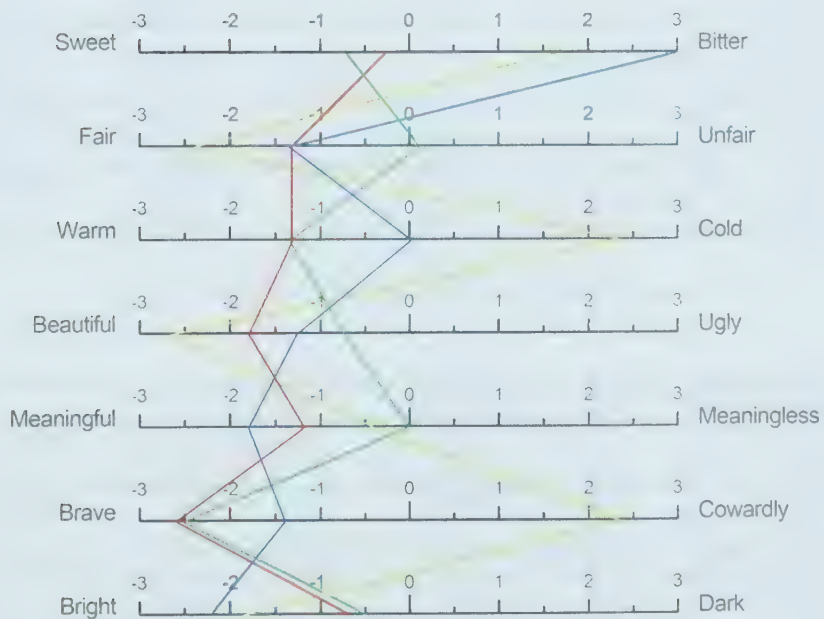


Figure A-5 Natural SD from the aged

iii. Results of the existing products evaluation

| | | Reliable | Comfortable | Simple | Friendly | Natural |
|------------|---------|----------|-------------|--------|----------|---------|
| Product 1 | Average | 3.25 | 4.25 | 4.50 | 3.50 | 3.50 |
| | StanDev | 0.50 | 1.50 | 1.00 | 0.58 | 0.58 |
| Product 2 | Average | 3.75 | 3.25 | 3.25 | 4.00 | 3.50 |
| | StanDev | 0.96 | 0.96 | 0.96 | 0.82 | 0.58 |
| Product 3 | Average | 3.75 | 4.50 | 4.75 | 3.50 | 3.25 |
| | StanDev | 0.50 | 0.58 | 0.50 | 0.58 | 0.50 |
| Product 4 | Average | 3.75 | 3.75 | 4.25 | 3.25 | 3.75 |
| | StanDev | 0.96 | 1.26 | 0.96 | 0.96 | 0.96 |
| Product 5 | Average | 4.50 | 4.75 | 4.00 | 3.75 | 3.50 |
| | StanDev | 0.58 | 0.50 | 0.00 | 0.96 | 0.58 |
| Product 6 | Average | 3.50 | 3.75 | 3.75 | 4.00 | 4.50 |
| | StanDev | 0.58 | 0.96 | 0.96 | 0.00 | 0.58 |
| Product 7 | Average | 4.00 | 3.75 | 4.25 | 3.75 | 3.75 |
| | StanDev | 0.82 | 0.96 | 0.96 | 0.96 | 0.50 |
| Product 8 | Average | 4.25 | 4.00 | 4.75 | 4.00 | 4.00 |
| | StanDev | 0.50 | 0.00 | 0.50 | 0.00 | 0.82 |
| Product 9 | Average | 4.25 | 4.00 | 4.25 | 3.75 | 3.75 |
| | StanDev | 0.96 | 0.85 | 0.96 | 0.50 | 0.50 |
| Product 10 | Average | 4.00 | 4.25 | 4.75 | 3.75 | 4.00 |
| | StanDev | 0.00 | 0.5 | 0.5 | 0.96 | 0.82 |
| Product 11 | Average | 4.00 | 4.00 | 3.75 | 4.00 | 3.75 |
| | StanDev | 0.00 | 0.82 | 0.96 | 0.00 | 0.50 |
| Product 12 | Average | 3.75 | 3.75 | 3.50 | 4.00 | 3.75 |
| | StanDev | 0.50 | 0.98 | 0.58 | 0.82 | 0.96 |

TableA-1 Evaluation of the existing Products by the Aged

| | | Reliable | Comfortable | Simple | Friendly | Natural |
|-----------|---------|----------|-------------|--------|----------|---------|
| Product 1 | Average | 3.44 | 3.33 | 4.00 | 3.22 | 2.67 |
| | StanDev | 0.88 | 1.22 | 1.41 | 1.09 | 1.32 |
| Product 2 | Average | 2.33 | 2.23 | 1.89 | 2.34 | 2.56 |
| | StanDev | 0.71 | 0.67 | 0.78 | 1.00 | 1.42 |
| Product 3 | Average | 3.00 | 4.00 | 3.89 | 3.89 | 3.11 |
| | StanDev | 1.12 | 1.00 | 0.93 | 0.78 | 0.93 |
| Product 4 | Average | 4.67 | 4.22 | 3.00 | 3.45 | 2.67 |
| | StanDev | 0.71 | 0.83 | 0.87 | 1.43 | 0.71 |
| Product 5 | Average | 3.33 | 3.67 | 3.67 | 3.56 | 2.89 |

| | | | | | | |
|------------|---------|------|------|-------|------|------|
| | StanDev | 0.87 | 1.22 | 1.00 | 0.73 | 0.78 |
| Product 6 | Average | 3.11 | 3.89 | 3.78 | 3.78 | 3.44 |
| | StanDev | 1.05 | 0.78 | 0.97 | 0.83 | 0.88 |
| Product 7 | Average | 4.00 | 3.11 | 4.00 | 3.22 | 3.11 |
| | StanDev | 1.00 | 0.93 | 0.717 | 0.97 | 0.78 |
| Product 8 | Average | 3.33 | 3.56 | 3.56 | 3.89 | 3.22 |
| | StanDev | 1.32 | 0.54 | 0.88 | 0.93 | 0.67 |
| Product 9 | Average | 3.56 | 3.33 | 3.11 | 3.33 | 3.11 |
| | StanDev | 0.88 | 1.00 | 0.78 | 1.00 | 0.78 |
| Product 10 | Average | 3.44 | 3.44 | 2.89 | 3.00 | 2.78 |
| | StanDev | 0.73 | 0.53 | 1.05 | 0.87 | 0.83 |
| Product 11 | Average | 3.22 | 3.56 | 3.44 | 4.00 | 3.00 |
| | StanDev | 0.83 | 1.01 | 0.73 | 0.87 | 0.87 |
| Product 12 | Average | 3.78 | 2.89 | 2.56 | 3 | 2.78 |
| | StanDev | 0.83 | 0.60 | 0.88 | 0.87 | 0.67 |

Table A-2 Evaluation of the Existing Products by the Youth

iv. Notes of the conversation in the interviews

1. Summary of the conversation with aged people in Jinan, Dec.9

| Chinese | English |
|---|--|
| 操作简单，功能不宜太多，功能太多大多用不着，而且记忆困难。按钮是比较好的操控方式，因为按钮的操控简单而且反馈确定性高。 | Easy – operated, limited functions, buttons. Some of the functions are useless and multifunction is hard for aged people to bear in mind Button is relatively easy to operate with a certain respons. |
| 实时的全自动控制最好，信号的输出最好有声光电多种输出方式，用以满足不同人的需求。 | Real-time automatic control. Multi-output method, such as acoustical, optical, or even shaky, in order to meet different users' needs. |
| 老人喜欢大尺寸，大字体。老年人听力视力的衰退是必然。 | Large font, large size should be more acceptable for the aged. With the senescence, it is inevitable that the decline of the abilities of eyesight and hearing |
| 一些老年人建议手机增加监控功能，因为一般情况下人们会把手机放在身边 | Some of them advise to add some monitoring functions into cell phone, since people always take along with their cell phones. |

| | |
|--|---|
| 老年人普遍认为传统水印血压计准确，电子产品易受电磁波等的干扰，会不准确。 | It is commonly said that the traditional mercury blood pressure monitor should be more authentic than electronic ones, because people think the electronic products are easily affected by surroundings, like electromagnetic wave, which will due to incorrect testing result. |
| 血压等别人测量会较自己测量准确 | The results obtained from the monitors but operated by the others should be more believable rather than what by users themselves |
| 有些老年人认为要保持健康的体魄，生活规律，合理饮食加适量运动是最好的。保健品治标不治本。 | The best ways of keep fit are health diet, disciplinary schedule, and proper physical practice. The nutrition and health supplies can not deal with the health problem ultimately. |

Other conditions noticed from the questionnaire:

The amount of home-based health care products is various ranging from 1 or 2 to 8 or 9. usually the families would have thermometers mostly mercury, blood pressure monitors and some massage machine.

Majority of the related products were purchased by other people, like children or spouse rather than users themselves.

2. Summary of the interview with designers

Interviewee: Peter Gao,

Telephone Interview

Date: Dec.12th, 2008

Duration: 9-10pm

| Chinese | English |
|--------------------------------------|---|
| 老龄化严重， | The aging of the society is a serious issue in China. (How about all over the world) |
| 看不清楚（声音大，字体大，按键大） | Week eyesight need louder voice/ring, larger font and larger buttons. |
| 老年人用手机的关注的焦点问题很简单，但是目前市场现有产品的满意仍然很差。 | The focus problem of the cellphone for the aged are simple, however the satisfaction of the available products is still much worse. |
| 老年人手机在城镇和农村都存在有大量的使用者。 | The users of the cell phone for the aged are available in both urban and suburban areas. |
| FWP 固定无线电话 | FWP Fixed Wireless Phone, a over dated tech but very feasible for suburban areas. |
| 大多老年人使用的是年轻人淘汰的手机，并不是为他们自己购买的。 | Usually the cell phones used by the aged people are not bought for them but second-hand from the young. |

| | |
|---|--|
| 现有市场的产品更多为一种临界状态的产品，即老年人和年轻人均可使用。 | Most of the products in the market are in a critical state. Viz. both the aged and the young can make use. |
| 老年人可能更习惯使用旋钮 | The aged people might more likely to use knob, originally used in radios. |
| 一些电子产品的常用名词，对于老年人很难理解，例如“菜单” | It is relatively hard for the aged people to understand some common terms in electronic products, for example, “menu” |
| 当涉及的产品对用户的心里需要时，难度很大。年轻一代可能会考虑心里需要。 | When it comes to the psychological needs, it is hard to explore and predict. The younger generation might consider their psychological needs. |
| 针对消费者和使用者不同这一问题，一般是年轻人选择购买。年轻人和老年人对手机的功能诉求上有共同点，形态上不一定老气，更倾向有朝气，有品味。而且专门购买该类产品的年轻人大多有一定的经济基础。 | Considering the issue of the users and the consumers are different group of people, it is the young to make some purchase commonly. Both the young and the aged have common ground in pursue of function, and the form of the products should likely to be full of youthful spirit and modern taste rather than old mannish. Additionally, the young people purchase those sorts of products for the aged are always better financial state. |
| 年轻人希望家用医疗设备（血压计）有记录功能，并容易读取历史数据。（用电脑） | The young people regard that the home-based health care products, blood pressure monitor for example, should associated with some memory functions for they to ready the history form some equipment like computer. |
| 当现今有生力量一代老龄化后,他们能否跟得上时代取决于学习能力和生活层次 | When the young people get older, whether they will behind the time depends their capabilities and living level. |
| 现今有生力量一代实际健康状况不如上一代（花眼+近视）可能会延伸新的产品。 | It is true that the actual health condition of the young people is not better than the senior generation. So as some brand new type of products will come out probably. (glasses for both myopia and presbyopia) |
| 逃避设备上的东西等（如果有关设备没有进步）。更加期望回到自然。 | (when the young people get older)They may try to get rid of machinelike stuff, if related products were not improved. They wish to return back to nature. |
| 目前 35 岁以上的人都在锻炼，比较年轻的一代人更加关注自己的健康。他们有可能会更早地在家庭引入家用健康设备。 | Nearly all the young people older than 35 take exercises and pay more attention to their health than the younger people. So that they might bring home-based products into family earlier. |

3. Contents of the interview with doctors

Interviewee: Liyan Han, Xujin, Liu

Location: Qilu Hospital, Jinan, Shandong, China

Date: Dec.12th, 2008

Duration: 3-4pm

| Chinese | English |
|---|--|
| 目前作为医生，接触的多为患者，即已患病的人群 | As a surgeon, the mostly people they met are patients, who are already suffered by some diseases. |
| 一般情况下患者会主动询问有关健康监护产品的相关知识。 | Commonly, the patients will ask for some info about the health care products forwardly. |
| 作为医生不太熟悉现有市场的品牌所以无法做出相应的推荐。此外，一般情况下对于病情较稳定的患者会建议到医院做定期检查。 | It is hard for the surgeon to do some suggestion on that type of products, because of unfamiliar with the market and brands. Besides, they usually advise the patients with stable conditions to do regular examine on time. |
| 根据经验汞柱血压计确实较电子血压计准确。 | Based on their experience, the traditional mercury blood pressure is indeed more believable than the electronic. |
| 医疗设备的可信任性和准确性最重要 | The most important thing as medical/health care products are believe and veracity. |
| 家用医疗设备市场潜力很大，该产品的主要使用集中在城镇居民。患者的接受程度很大取决于教育程度。 | There is a great potential in the market for home-based health care products, and majority of the users should be urban residents. And the capabilities of the patients mainly depend on the education background. |
| 目前国内在健康人群中广泛开展了定期查体。 | Nowadays, regular health examine is widely developed among common people in China. |
| 作为医生也意识到家用健康产品在很多情况下消费者与使用者是两个不同的人群。 | As a surgeon, they realized that the users and the consumers are different group of people. |
| 病情严重的患者才会使用心电监护仪。同时，对于高危患者，心电监护仪也是必需设备 | Electrocardiograph (ECG) monitor is required equipment for High-risk patients. In other words, the ECG monitor would be used only for that group of people. |
| 心电监护仪的各种连接线很多，会增加病人的焦虑感和恐惧感。 | There are lots of connection cords associate with ECG monitor and most of them would be connected to the patients' bodies, which will increase the anxiety and scare. |

| | |
|--|--|
| 心电监护仪最好是简便易携带，普遍认为安置监护仪的小车不方便。在紧急情况下，一般会直接抱着走。 | Easy-taken is better for ECG monitors, because the nurses will directly bring the monitors to emergency treatment regardless of the small carts designed specially for the ECG monitors for its inconvenience. |
| 心电监护仪的报警终端最好安置在护士值班室，以防报警加大患者的焦虑或者影响其他患者。 | The alarm terminal should be fixed in the nurse service center. In case the alarm will increase the anxiety of the patients or disturbing other patients. |
| 护士作为操作心电监护仪的主要人群，他们不喜欢使用触摸屏。 | Nurses, the primary group of operating the ECG monitors, dislike touch-screen. |
| 水银式体温计在医院已经被基本淘汰，目前医院常用的为纸片式体温计，但是该类型体温计读取性较差。 | Traditional mercury thermometers are fallen into disuse. |

APPENDIX III. Visual Documentation

i. Pictures of Existing Products

| | |
|---|---|
| <p>Product 1</p>  | <p>Product 2</p>  |
| <p>iPhone, designed by Apple Industrial Design Team of Apple Inc.</p> | <p>Cellphone, Designed by Openmoko</p> |
| <p>Product 3</p>  | <p>Product 4</p>  |
| <p><i>Vicks Forehead Thermometer</i>, designed by Scott Henderson, IDSA of Scott Henderson Inc. and Steve Russak, IDSA for the Kaz ID Group of Kaz Inc..</p> | <p>Magewheels 2-Gear Wheelchair Drive, designed by Steve Meginniss, Cisco Sabin of Magic Wheels, Inc. and Andy Carlson of Carlson Studios</p> |
| <p>Product 5</p>  | <p>Product 6</p>  |
| <p><i>Vicks Underarm Thermometer</i>, designed by Scott Henderson, IDSA, Jim Best, Tim Kennedy, Willy Loo. Jennifer Fisher, Dan Formosa and Marco Perry of smart Design; and Andrew Howansky of Kaz, Inc., for Kaz.</p> | <p><i>Tone Hearing Aid</i>, designed by kiel Mohrman, Columbus College of Art and Design</p> |

| | |
|---|---|
| <p>Product 7</p>  | <p>Product 8</p>  |
| <p>Digital Thermometer, designed by Omron</p> | <p>Blood pressure Monitor, designed by LKK</p> |
| <p>Product 9</p>  | <p>Product 10</p>  |
| <p>Pulse Oximeter, designed by LKK</p> | <p>Blood pressure Monitor, designed by Omron</p> |
| <p>Product 11</p>  | <p>Product 12</p>  |
| <p>Blood Pressure Monitor, designed by LKK design Team of LKK. Inc</p> | <p>Blood pressure Monitor, designed by Omron</p> |

ii. Additional Sketches

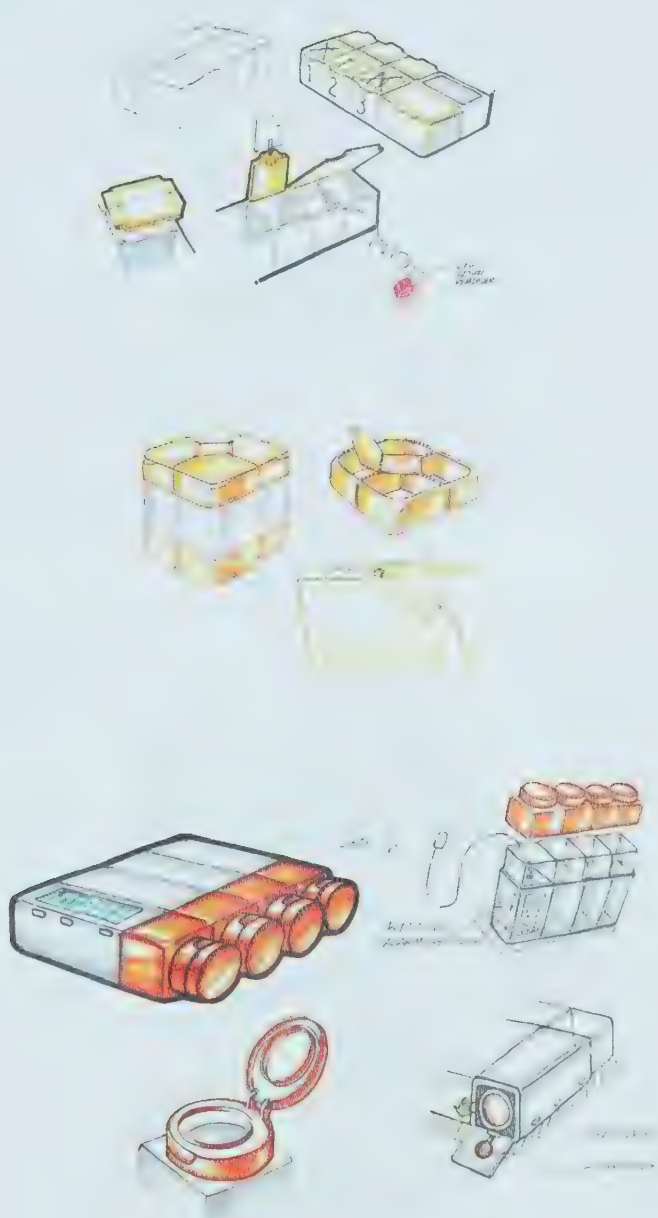


Figure A-6 Additional Sketches of Medication Collector

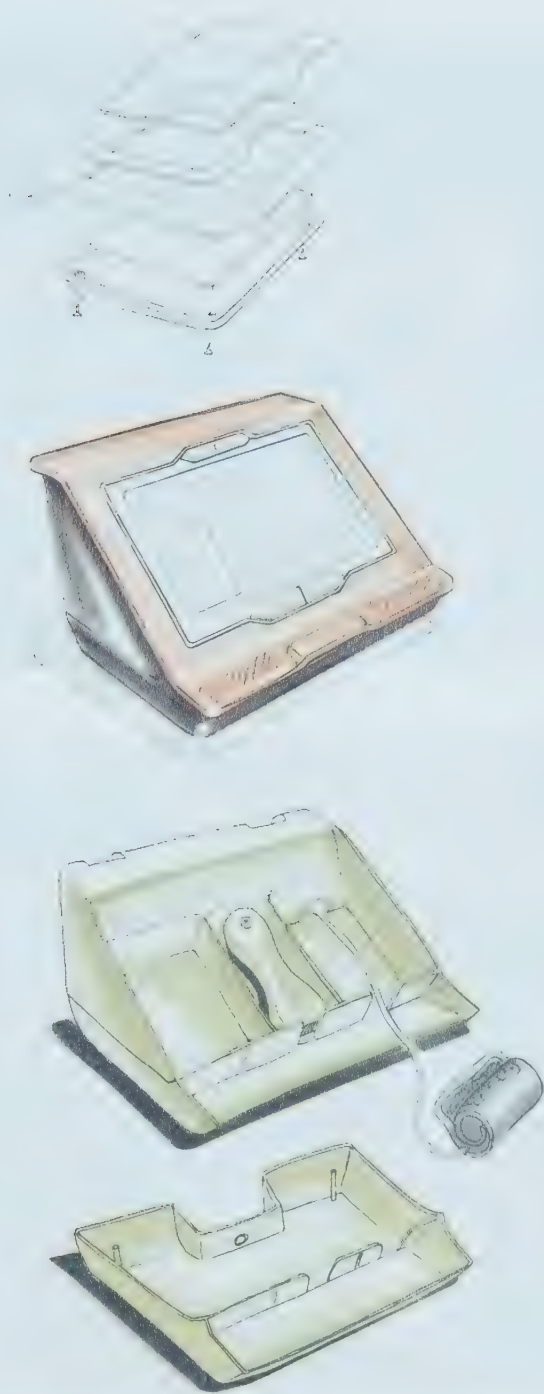


Figure A-7 Additional Sketches of Health Care digital Assistant

iii. Exhibition Documentation



Figure A-8 Front View of the Showcase



Figure A-9 Perspective View of the Showcase

iv. Interface stimulating, testing Mummy's Blood Pressure.



Power Off



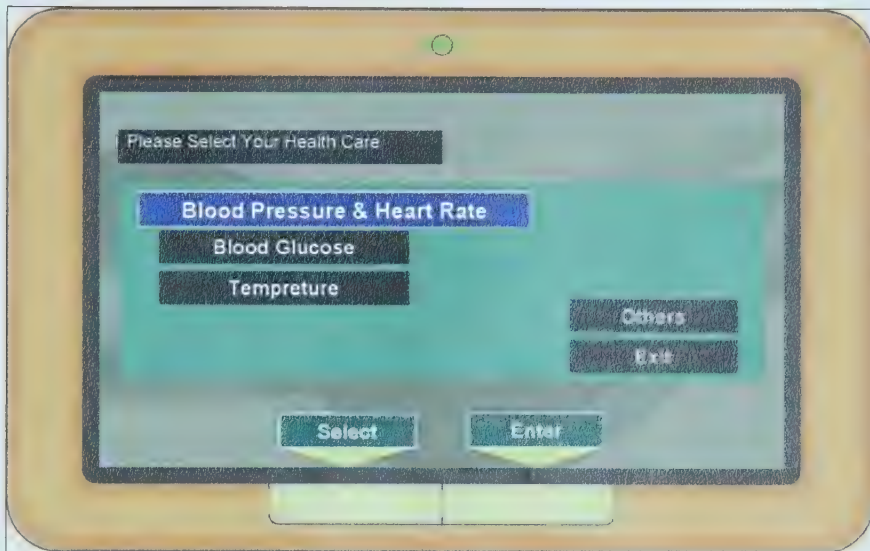
Power On and the welcome Page



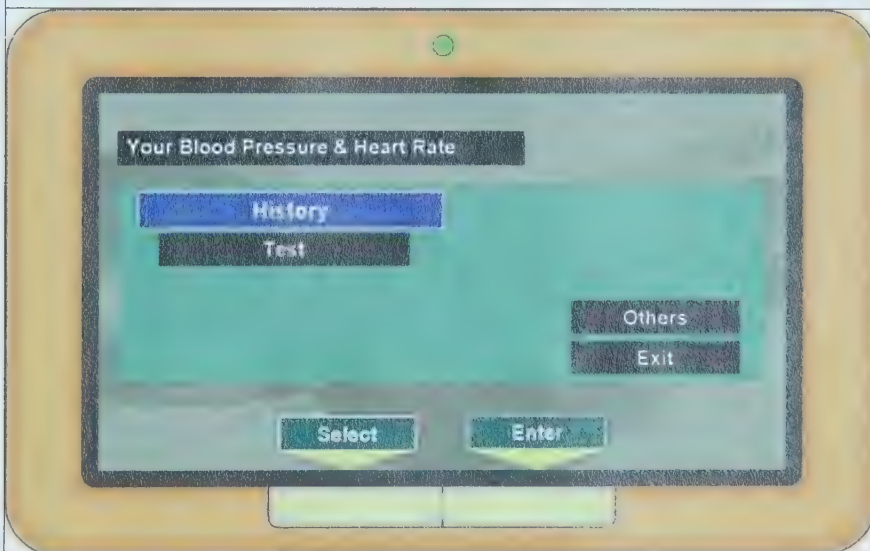
The User Options come out automatically, the first user is high lightened in default.



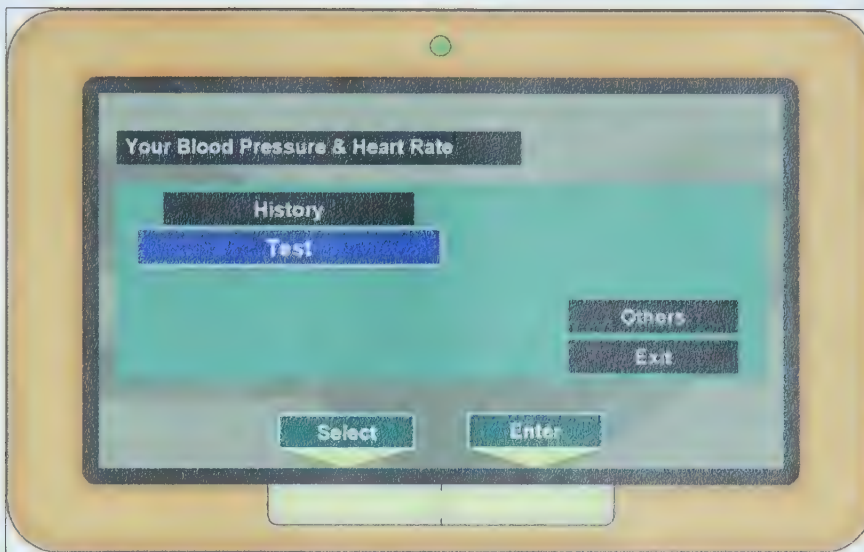
Press Select button the Mummy option is high lightened, then press Enter button.



After pressing Enter button, the function menu come out. The first function is high lightened in default. Press Enter button go into Blood Pressure & Heart Rate function.



The page for Mummy's Blood Pressure & Heart Rate come out, the History is high lightened in default. Press select button.

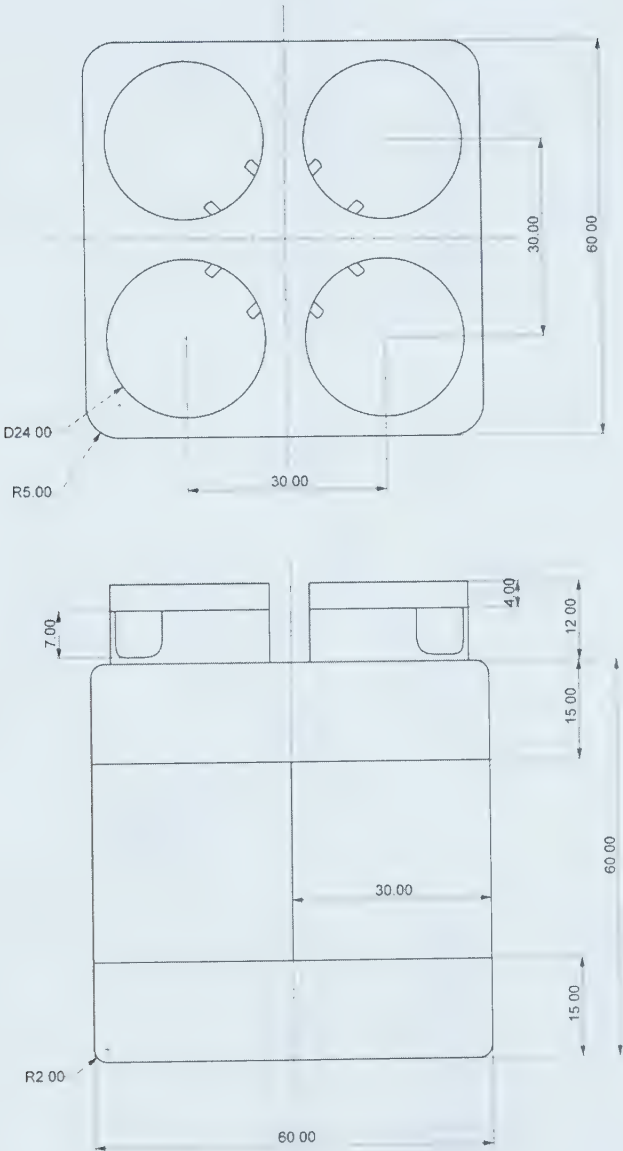


The Test is high lightened after pressing the Select button. Put on the cuff and press Enter.

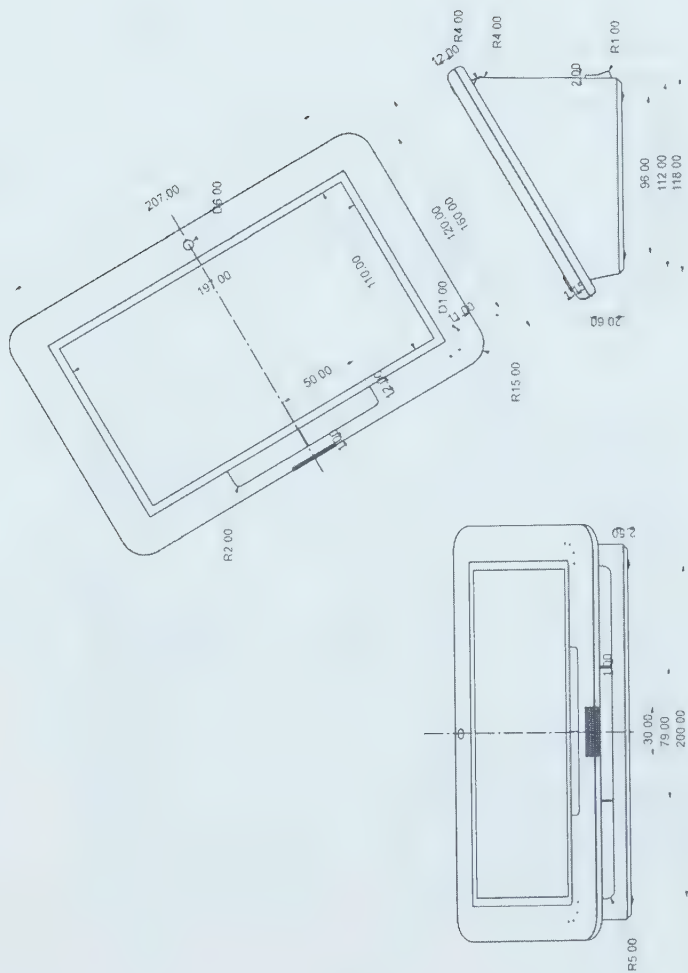


The results of the blood pressure and will come out soon.

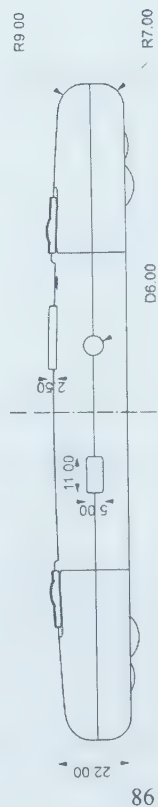
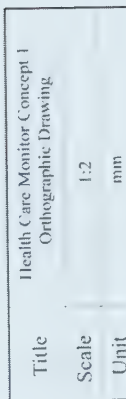
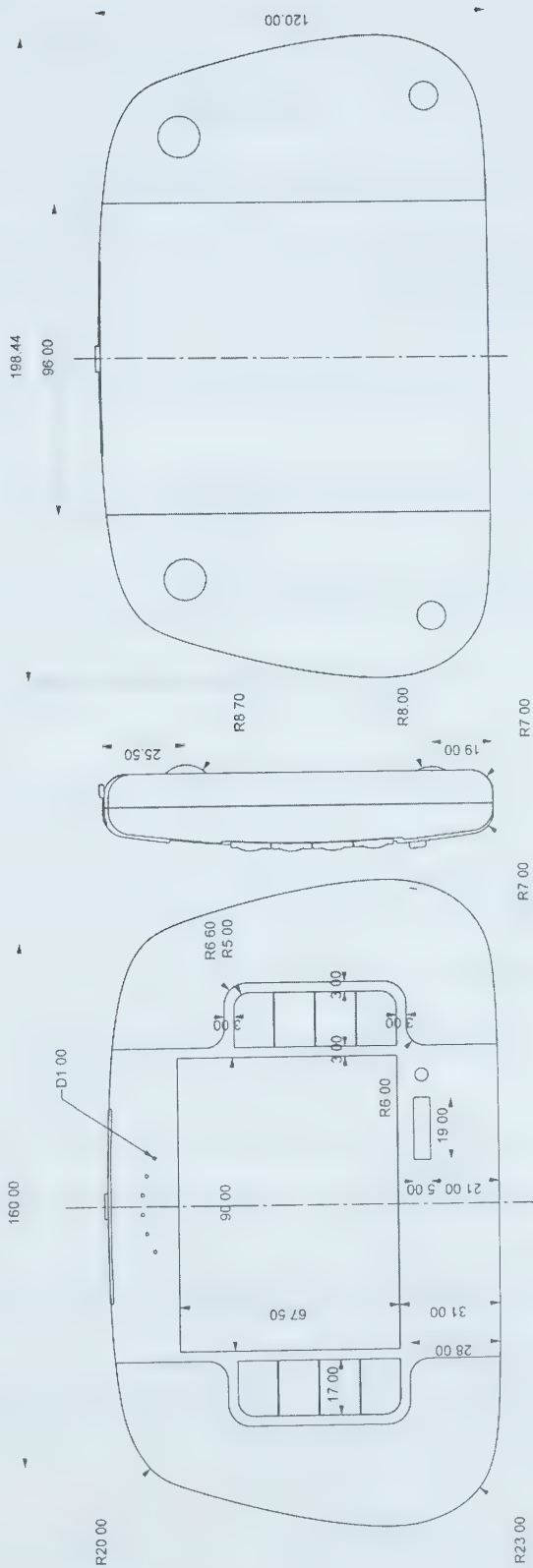
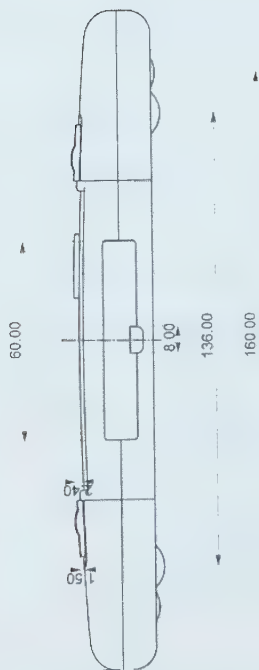
v. Orthographic Drawings



| | |
|-------|--|
| Title | Medication Collector Orthographic Drawing |
| Scale | 1:1 |
| Unit | mm |



| | | |
|-------|-------------------------------|--|
| Title | Health Care Monitor Concept 2 | |
| | Orthographic Drawing | |
| Scale | 1:4 | |
| Unit | mm | |



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Master of Design
Spring 2010

C11154